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HS-015 830 HS-015 994
HS-801 204; 209; 255; 317; 346; 348 350;
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National Highway Traffic Safety Administration

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ABSTRACT CITATIONS

HS-015 830

PEDESTRIAN SPACE

A method for reconciling compactness with ease of movement on foot in order to restore to downtown areas their superior ability to bring large numbers of people together in constantly shifting groups is established. Study objectives were to determine how much pedestrian travel is linked to buildings of various types and when that travel occurs, and to attach appropriate space requirements to the magnitudes of travel demand. The study showed that: reducing the area devoted to motor vehicles would inconvenience relatively few people; the area devoted to buildings will be reduced substantially if existing zoning requirements for plazas continue to be applied, but the plazas themselves should be used efficiently for both circulation and amenity; and pedestrian space underground can be provided by private developers if sufficient bonus incentives are given through zoning. Higher building densities, which this implies, could be easily handled with additional walkway space as long as walkway space requirements are firmly linked to building bulk.

by B. Pushkarev; J. M. Zupan
Regional Plan Assoc., New York City
Publ: HS-014 096, PROCEEDINGS OF THE PEDESTRIAN/BICYCLE PLANNING AND DESIGN SEMINAR, Berkeley, 1973, p66-79
1973
Availability: In HS-014 096

HS-015 831

SIMULATION TOOLS FOR DESIGNING PEDESTRIAN MOVEMENT SYSTEMS IN URBAN TRANSPORTATION FACILITIES

Development of a transit station simulation package that can be used to improve and facilitate the transit station planning, design, and evaluation process is described. The principal features of this planning package are: the development of a data processing technique employing a series of mathematical models to simulate pedestrian flow through the various parts of a transit station; and the integration of this simulation technique into an overall user-oriented framework for designing station facilities and evaluating the effectiveness of their operation. The advantages of the simulation approach are illustrated, including determining peaking volumes, sizing queueing facilities, and determining internal movement times. The system concept is detailed with tables and charts in terms of origin and destination information, station configuration, specific parameters, overall simulation operation, and design standards.

by P. Fausch
Barton-Aschman Assoc., St. Paul, Minn.
Publ: HS-014 096, PROCEEDINGS OF THE PEDESTRIAN/BICYCLE PLANNING AND DESIGN SEMINAR, Berkeley, 1973, p80-94
1973 ; 17refs
Sponsored by the Urban Mass Transp. Administration.
Availability: In HS-014 096

HS-015 832

PLANNING FOR A MOVING WALK SYSTEM

Planning for a moving walk system is described, and the characteristics of the approximately 150 existing moving walks are discussed, including types of applications, length, width, slope and speed. Engineering considerations are given along with moving walk capacity, human factors, and legal considerations. Two experimental accelerating beltway systems which are being tested, one at the Battelle Institute in Geneva, and the other at the Applied Laboratory at Johns Hopkins University are described.

by R. Kuner
Barton-Aschman Assoc., Inc., Chicago, Ill.
Publ: HS-014 096, PROCEEDINGS OF THE PEDESTRIAN/BICYCLE PLANNING AND DESIGN SEMINAR, Berkeley, 1973, p95-106
1973 ; 17refs
Availability: Bound in HS-014 096

HS-015 833

THE PEDESTRIAN NET: PLANNING AND MAINTAINING CONTINUITY

The conflict between automobiles and pedestrians is examined in terms of the interference and hazards to pedestrians of parking lot entrances, tunnel and bridge approaches, unduly wide street intersections, the visual blight or obstruction of parked vehicles filling spaces between buildings, and the impediment to free pedestrian flow of all moving vehicles. Identification of the pedestrian network is discussed along with its repair and new development within the framework of the urban net. Consideration is given to horizontal displacement (the closing off of streets to vehicles or the creation of new walkways) and vertical warp which can place commercial valleys between residential island hills with connecting walkways. Solution would seem to be a meaningful structured separation of automobile and pedestrian traffic allowing free flow of each.

by B. Benepe
Hancock, Little, Calvert, Inc., New York City
Publ: HS-014 096, PROCEEDINGS OF THE PEDESTRIAN/BICYCLE PLANNING AND DESIGN SEMINAR, Berkeley, 1973, p116-21
1973 ; 1ref
Availability: In HS-014 096

HS-015 834

PLANNING FOR PEDESTRIANS AT THE WORLD TRADE CENTER

When the New York World's Trade Center is completed in 1974, it is estimated that 130,000 people, workers and visitors, will arrive or depart during morning or evening rush hours. Subway, rail, automobile, taxi, and bus transportation will be their means of transport. Intensive studies were conducted to provide means of planning adequate access and flow of pedestrians. The exterior analysis involved pedestrian studies concerned with the transport and movement of workers and visitors to the periphery of the complex. Studies conducted were: a determination of travel methods of getting to work,

train capacity analysis, station capacity analysis, peak-hour pedestrian flow analysis, a sky count analysis of sidewalk congestion, and the effect of staggering work hours in the downtown area. An interior analysis was made on the development of connecting passageways between the subway stations and the center, and the establishment of flow patterns within the center. This involved study of the peak-hour flow, elevator simulation of peak-hour arrivals and departures, and staggered work hours. At the time of the study, there appeared to be no bottlenecks or potential problem areas, but continuing surveys are planned to monitor pedestrian flows at the stations, street intersections, and passageways near or within the complex.

by F. N. Caggiano
Port Authority of New York and New Jersey
Publ: HS-014 096, PROCEEDINGS OF THE PEDESTRIAN/BICYCLE PLANNING AND DESIGN SEMINAR, Berkeley, 1972, p137-47
1973 ; 2refs
Availability: In HS-014 096

HS-015 835

HEAVY DUTY TRUCK TANDEM SUSPENSION FOR ON/OFF HIGHWAY APPLICATIONS

The design, development, and testing of a heavy duty truck tandem suspension intended for vehicles that must operate both on and off the highway is described. The notable features of this suspension are a nonlinear spring rate, improved axle vertical travel, the wide span over which the suspension is mounted to the frame, and the ease with which the suspension accomodates different spacings between the tandem axles. Details are given for the axle vertical travel, controlling bogie hop, ride quality and stability. Problems previously seen on on-off highway suspension that have been solved with this suspension are the mixer lean problem, excessive frame rail deflection requiring use of frame liners, inadequate roll stability and rough ride when empty. Rough ride problems were eliminated using an extremely nonlinear spring rate. The roll rate was enhanced by the spring rate characteristics, and by providing a high roll center to decrease load side shifting. The mixer lean and frame rail deflection problems were reduced by spreading out the support points at which the suspension attaches to the frame rail.

by T. H. Watson
Oshkosh Truck Corp.
Rept. No. SAE-740306 ; 1974 ; 9p
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.
Availability: SAE

HS-015 836

TEMPERATURES OF FLUIDS IN PASSENGER CAR POWER TRAINS

The temperatures of engine oil, automatic transmission fluid, and differential lubricant were measured under a variety of steady-state conditions in 1969, 1971, 1972, and 1973 model year cars. Increases in engine speed and stroke and coolant temperature increases appeared to be the principal causes of automatic transmission fluid temperature increases. Differential lubricant temperatures increased as engine speed and load increased, but speed was the more influential variable. The effect of ambient temperature was negligible in all cases over the narrow range of ambient temperatures investigated (65-85 deg F). Analysis of the data for year-to-year trends showed that only engine oil temperatures increased from 1969 to 1973. This trend, and several observations of engine oil temperatures greater than 300 deg F, suggest that improved resistance of engine oils to oxidative thickening may be required.

by N. E. Gallopoulos
Res. Labs., General Motors Corp.
Rept. No. SAE-740307 ; 1974 ; 23p 19refs
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.
Availability: SAE

HS-015 837

THE PEDESTRIAN AND BICYCLIST IN THE URBAN SETTING

Problems resulting from pedestrian and bicyclist flow in New York City are examined and the reactions of city administrators are discussed. Two projects are described: a proposal for one or more safe bike lanes for commuting purposes, and a proposal for a series of pedestrian malls in midtown Manhattan, which has been reduced to a test of a mall on a portion of Madison Avenue. Hatred between walkers and drivers in New York's central business district is described, along with the huge numbers of people involved. Examples are cited of increased bicycle usage. Bitter opposition from business and real estate interest regarding the Madison Mall plan is noted, along with the lack of organization among walkers and bicyclists who would benefit. It is suggested that political influence is necessary for the successful completion of such projects.

by C. Sidamon-Eristoff
New York City Transportation Administration, N. Y.
Publ: HS-014 096, PROCEEDINGS OF THE PEDESTRIAN/BICYCLE PLANNING AND DESIGN SEMINAR, Berkeley, 1973, p161-3
1973
Availability: In HS-014 096

HS-015 838

ANALYSIS OF SOURCES OF ERROR IN HEADLAMP AIM

The literature on headlamp aiming is surveyed in detail to pinpoint the various sources and magnitudes of aim variance. Four major sources of variance are identified (differences between beam and mounting plane, photometric changes in use, long axis alignment, and human factors), along with a number of others of lesser consequence. Illustrations are offered showing the expected population variance under a variety of conditions. It is apparent that, at the present state-of-the-art, a substantial percentage of the lamp population can be expected to be beyond the limits recommended in SAE J599c. It is further apparent that this would be true regardless of whether or not a vehicle inspection program is in operation. Recommendations are given regarding research emphasis in headlighting. Ways of reducing variance from the most significant sources are considered and suggestions offered.

by P. L. Olson; R. G. Mortimer
Hwy. Safety Res. Inst., Univ. of Mich.
Rept. No. SAE-740312 ; 1974 ; 11p 10refs
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.
Availability: SAE

HS-015 839

AUTOMOBILE FUEL ECONOMY WITH HYDROMECHANICAL TRANSMISSION BY SIMULATION STUDIES

A simulation study is made to show the fuel economy achieved with a hydromechanical transmission, as compared to a conventional automatic transmission. Both engine transmission combinations were studied over identical city and suburban driving cycles, taking into account the losses in the transmissions, as well as the inertia of the components during acceleration and deceleration. The hydromechanical transmission is used in this study because it presents a near-term solution to the fuel economy problems. All of the parts that make up such a transmission are well-known state-of-the-art components, thereby considerably reducing the required development time. The simulation program gives reasonable correspondence with test results for fuel economy and acceleration performance of a full size automobile with a 3500 cubic inch displacement engine and conventional three-speed automatic transmission. The simulated acceleration performance of this vehicle is closely matched if the engine displacement is reduced to 3000 cubic inches and the conventional transmission replaced by a three-range hydromechanical transmission.

by E. Orshansky; P. Huntley; W. E. Weseloh
Orshansky Transmission Corp.
Rept. No. SAE-740308 ; 1974 ; 19p 12refs
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.
Availability: SAE

HS-015 840

COMPUTER SIMULATION EVALUATION OF CURRENT U.S. AND EUROPEAN HEADLAMP MEETING BEAMS, AND A PROPOSED MID BEAM

A computer simulation of a nighttime meeting between two vehicles is described, including results showing the correspondence between predicted visibility distances and those obtained in field tests. The simulation is used to compare visibility distances and glare effects in meetings between vehicles equipped with the U. S. low beam, European low beam, and an experimental mid beam, in various conditions of aim. Results of this study suggest that differences between European and U. S. low beams are of little practical consequence. By comparison, the mid beam appears to offer a potentially improved meeting beam, pending resolution of problems of rear-view mirror glare, beam switching, etc.

by R. G. Mortimer; J. M. Becker
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.
Rept. No. SAE-740311 ; 1974 ; 8p 4refs
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974. Sponsored by the Motor Vehicle Mfrs. Assoc. of the U. S., Inc., Detroit, and by Donnelly Mirrors, Inc., Holland, Mich.
Availability: SAE

HS-015 841

THE CHICAGO EXPERIENCE IN BICYCLE FACILITY PLANNING AND DESIGN

Chicago's comprehensive plan is described which sets forth five major goals for the development of a bikeway system: creation of a continuous bikeway along the lakefront from the Evanston City limits on the north to Calumet Park on the south; development of a system of bikeways to connect existing bicycle paths in Chicago parks with each other and with existing and proposed bikeways in adjacent County and State recreation areas; development of a system of bikeways to serve major generators and attractors of bicycle commuters; development of specialized bikeway systems in areas of architectural, historic, or similar interest; and development of needed supportive services such as secure parking facilities, for users of the bikeway system. Future plans for the system are also considered. Results of two surveys are given: one regarding the availability of bicycle parking, and the other of the opinions of both bike riders and nonriders as to the value of the bikeway system. A survey questionnaire soliciting citizen comments of the city's preliminary bikeway programs is included. Bicycle lane and path markings and rules of safe bicycle riding are commented on.

by M. A. Zimmerman
City of Chicago, Ill.
Publ: HS-014 096, PROCEEDINGS OF THE PEDESTRIAN/BICYCLE PLANNING AND DESIGN SEMINAR, 1972, Berkeley, 1973 p202-7
1973
Availability: In HS-014 096

HS-015 842

THE LAKEWOOD EXPERIENCE: PLANNING FOR BICYCLE FACILITIES

A planning process initiated in 1971 by the Lakewood, Colorado, city government is described, which aimed at: making recommendations regarding location, design and construction of bicycle facilities; licensing and regulating bicycling in the community; and locations and types of other recreational trails, including trails for equestrian and pedestrian use. The methodology of the planning effort is reviewed and evaluated. Consideration is given to criteria for program success, parking violations by automobiles, intersection conflicts, and costs. It is concluded that citizen involvement in such planning is needed to work with the staff experts, and the Lakewood Citizens Advisory Committee on Trails is cited.

by R. McCoy
City of Lakewood, Colo.
Publ: HS-014 096, PROCEEDINGS OF THE PEDESTRIAN/BICYCLE PLANNING AND DESIGN SEMINAR, 1972, Berkeley, 1973 p 208-11
1973
Availability: In HS-014 096

HS-015 843

OREGON BIKEWAY PROGRAM

The bikeway program established in Oregon is described in which the first funded statewide bicycle path and pedestrian legislation in the nation was established. A 1970 statute provides that not less than 1% of funds received from the State Highway Fund by any city or county, or by the State Highway Commission, shall be expended for the establishment and maintenance of footpaths and bicycle trails. Cities and counties with a small amount of funds available can accumulate them for a period not to exceed 10 years. Planning and coordination of the bicycle route program is described along with the involvement of the public, bikeway design, and the initial

experiences and costs of the program. All bike routes are being monitored for actual usage as they become operational. A preliminary study shows the average cost per bicycle user mile to be $0.32.

by J. D. McClure
Oregon State Highway Div., Salem, Oreg.
Publ: HS-014 096, PROCEEDINGS OF THE PEDESTRIAN/BICYCLE PLANNING AND DESIGN SEMINAR, Berkeley, 1973 p 212-5
1973
Availability: In HS-014 096

HS-015 844

PUBLIC VIEW OF BICYCLE FACILITIES

The work of the San Francisco Bicycle Coalition, consisting of nine bicycle groups and environmental organizations, in promoting bicycle use and in educating the public is discussed, along with the public view of the kinds of bicycle facilities that are needed. Three segments of the public are examined: the hard-core automobile drivers, the broad range of persons who habitually use the automobile for city transportation but who have not eliminated other means, and the practicing cyclists who use the bicycle fairly regularly. Attitudes of each group are examined, and methods of achieving safety and convenience in bikeway planning are considered. Other measures besides bikeways for rider safety include painted lanes on city streets, and lanes created between car parking and sidewalks.

by J. Murphy
San Francisco Bicycle Coalition, Calif.
Publ: HS-014 096, PROCEEDINGS OF THE PEDESTRIAN/BICYCLE PLANNING AND DESIGN SEMINAR, 1972, Berkeley, 1973 p234-6
1973
Availability: In HS-014 096

HS-015 845

BIKEWAYS--THE FEDERAL ROLE

The federal government role in bicycling is examined, with focus on exploration of the potential of bicycling and bikeways, involving the interlocking of several disciplines: recreation, transportation, and urban planning. Each of these areas exhibits outstanding potential for alleviating problems caused by the energy crisis. Biker motivation is discussed along with its benefits, including environmental appeal and means of transportation. Limitations of cargo carrying and safety are noted. Its particular appeal in high density areas for short trips is considered, and bikeway planning in this regard is described. The necessity of federal, state, and local government cooperation with the private sector is stressed in such areas as rights-of-way acquisition.

by J. Rhinehart
Bureau of Outdoor Recreation, Department of the Interior
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p13-9
1974
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 846

PLANNING THE PEDESTRIAN ENVIRONMENT

Pedestrian circulation in metropolitan areas is discussed from the viewpoints of architects, engineers, planners, and developers, and the needs of the general public. Various myths and misconceptions are reviewed, and details are offered on pedestrian travel behavior, planning principles, and design concepts. The planning principles underscore the need for pedestrian movement continuity, and for the vertical separation of pedestrian, vehicle, and transit movements. Pedestrian movement methods include sidewalks, skywalks, subwalks, malls, plazas, concourses, building arcades, ramps or stairs, escalators, elevators, and microsystems. Case studies from Philadelphia, Washington, D. C., Seattle, and New York City are presented which illustrate applications of the various approaches in pedestrian circulation planning.

by H. S. Levinson
Wilbur Smith and Associates
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p37-73
1974 ; 5refs
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 847

SAFETY OF PEDESTRIANS AND ABUTTING PROPERTY OCCUPANTS

The seriousness of the pedestrian factor in vehicle accidents is discussed, and it is shown that the pedestrian problem is not confined to one area, with 65% of pedestrian fatalities occurring in urban areas and 35% in rural areas. In addition, approximately 45% of the pedestrian fatalities occur during the day. A federal research program is described which developed a dual approach to the problem. The feasibility and cost effectiveness of physical separation of pedestrians and vehicles was studied, including isolated pedestrian facilities such as overpasses, underpasses, skyways, and malls. Plans for the development of criteria for entire separate pedestrian networks in both new and existing communities are cited, with special provisions for children, the elderly, and physically and mentally handicapped.

by J. A. Fee
Offices of Res. and Devel., Federal Hwy. Administration, Washington, D.C.
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p85-95
1974
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 848

SCHOOL TRIP SAFETY AND URBAN PLAY AREAS. A STUDY OF THE YOUNG PEDESTRIAN

Since young pedestrians, under age 15, have experience problems using the public roadways, resulting in high accident

involvement, a study was conducted to investigate basic criteria and formulate guidelines which states and political subdivisions can use to develop statewide programs for the protection of children walking to and from school, entering and leaving school buses, and at urban neighborhood play. Data collection techniques devised to obtain driver and student knowledge, attitude and motivation through the conduct of driver and pupil surveys as well as covert observation of the behavior of both groups using super 8 mm motion picture filming have been pilot tested at Fairfax County, Virginia, elementary school sites. Some observations of the 1973 Summer Play Street Program in Manhattan, the Bronx, and Brooklyn, New York, were also made. The effort represents 20% of a planned two year program.

by M. L. Reiss
BioTechnology, Inc., Falls Church, Va.
Contract FH-11-8126
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p97-111
1974
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 849

BEHAVIORAL EVALUATION OF PEDESTRIAN COUNTERMEASURES

Three aspects of countermeasures and countermeasure effectiveness for pedestrian behavior are examined. A series of behavioral studies were conducted to determine the extent to which the proposed countermeasures inhibit those undesirable vehicular and pedestrian behaviors most often associated with a particular type of pedestrian accident. An accident data base was established in several cities, based on expansion of accident report forms to reveal the behavioral antecedents associated with the pedestrian accident. The resulting data base will serve as input in the design of a large scale countermeasure accident study which is planned. A survey in pedestrian safety information was also conducted, with recommendations made for improving the effectiveness of safety materials.

by W. G. Berger
BioTechnology, Inc., Falls Church, Va.
Contract DOT-HS-190-2-480
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p113-33
1974 ; 1ref
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 850

RESEARCH ON SAFETY AND LOCATIONAL CRITERIA FOR BICYCLE FACILITIES

Preliminary findings and prior research are reported related to the Federal Highway Administration-commissioned study on safety and locational criteria for bicycle facilities. Physical design elements are described in terms of on-street lanes and safety effects, bidirectional operations and wrong way riding, sidewalk bikeways, and capacity effects. Two key areas related to user projections are examined: willingness to detour, and cyclist surveys. It is shown that surveys are often an inadequate means of planning an urban bikeway system.

by D. T. Smith, Jr.
De Leuw, Cather and Co., 1256 Market St., San Francisco, Calif.
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p134-42
1974 ; 4refs
Sponsored by the Federal Hwy. Administration, Washington, D. C. Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 851

HUMAN RESPONSES TO STAIRWAYS, WALKWAYS AND RAMPS: SOME RECENT FINDINGS

Recent research directed at some physiological and behavioral interactions between man, stairs, and ramps is described. It is noted that some of the findings are not conclusive. Studies of stair accidents are discussed, with consideration given to gait analysis and riser/tread dimensions. It is shown that stairs that work well in ascent do not necessarily work well in descent. Energy expenditure of stairs, ramps, and walkways is also examined and related to satisfactory riser/tread combinations. The effect of stair layout and location on pedestrian movement patterns is further studied, and it is generally found that people are motivated to adhere to certain simple conventions that permit the walkway to be shared with others. It is concluded that stairs can be designed to be safer, more comfortable, convenient, and efficient in terms of flow and capacity.

by J. A. Templer
Georgia Inst. of Tech.
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p237-47
1974 ; 9refs
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 852

BIKEWAY PLANNING AND IMPLEMENTATION--THE MARYLAND EXPERIENCE

Plans and activities in Maryland for bikeway construction and general bicycle safety within the state are described. The greatest opportunities for bikeway activity are shown to be in college campus communities, mass transit systems, planned unit development and new towns such as Columbia, employment centers and shopping centers, and connections to major downtown routes and population centers. Recreational bikeway opportunities are described. Planning issues revolved around: the bicycle as an alternative form of commuter transportation; state, local, and municipality responsibility for bikeway planning and implementation; safety problems;

bikeway planning; design considerations; and allocation of transportation funds.

by P. R. Farragut
Maryland Dept. of Transportation, Environmental Studies Group
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p288-96
1974
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 853

THE TEMPE BIKEWAY STUDY

The Tempe, Arizona, bikeway study is described which included four phases: survey, background data gathering, design, and review. Design standards are defined, and a history of bicycling was summarized. Bicycle accidents were analyzed in terms of circumstances and causes. Priorities for bikeway construction were determined: providing access to bicyclist destinations; providing protection for bicyclists; and providing a continuous bikeway system. Design prototypes for both the bikeway proper and for intersections were recommended. Citizen participation was emphasized throughout the project. Adoption of the plan resulted in construction of 80 miles of bikeways and introduction of a regular program of bicycle education in the public schools.

by E. A. Drake
Tempe Planning Dept., Tempe, Ariz.
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p297-306
1974
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 854

PLANNING FOR CYCLISTS AS THEY SEE THEMSELVES INSTEAD OF AS MOTORISTS SEE THEM

Hazards of bicycle riding are described by a veteran cyclist, and suggestions are offered for improved safety. Examples of motorist bicyclist conflicts are cited along with differences in viewpoints among cyclists, drivers, and bikeway planners. High costs of channelization are discussed, and it is recommended that cyclists should be given the consideration of allowing them to ride in whichever lane provides the lowest probability of being hit, which in general is the lane specified by the existing vehicle code for each maneuver. It is concluded also that separate bikeways have not been useful. Suggestions are offered for reducing bicyclist motorist conflicts, including widening roads, planning for visibility from the cyclists' path, arranging signals and signs so cyclists can see them and they do not fade out, placing information signs early enough for the cyclist to get across traffic into the appropriate lane for a turn, and positioning traffic signal detectors so that cyclists actuate them. Palo Alto bicycle/motor vehicle accidents by cause and characteristics are tabulated, and the following conclusions drawn: 48.5% of the accidents were attributable to motorists and 51.5% to cyclists; intersection accidents are 19 times more frequent than midblock accidents; lane crossing or changing accidents are 60 time more frequent than lane sharing accidents; 37 times more accidents were caused by hazards aggravated by bikeways than by those ameliorated by them.

by J. Forester
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p315-30
1974
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 855

REGULATIONS FOR PEDESTRIAN AND BICYCLE SAFETY: WHY, WHO, WHAT AND HOW TO REGULATE

Some concepts and ideas on four basic aspects of regulations (i.e., laws, ordinances, codes, ets.) for pedestrain and bicycle safety are presented, who, why, what, and how to regulate. The most promising regulations that might be applied to pedestrians, bicyclists, drivers, designers and planners, operational personnel, and vehicle manufacturers and dealers are reviewed. NHSTA activities that are applicable for urban planners and others in the development process are also described. Specific safety problems and responsive regulations are outlined for several situations, including: vendor ice cream trucks, bus stops, multiple threat accidents, intersection dashes, dart out accidents, back-up pedestrian accidents, and bicycle operator behavior. Research and development progress is noted with emphasis on pedestrian safety.

by M. B. Snyder
National Hwy. Traffic Safety Administration
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p553-64
1974 ; 2refs
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 856

BICYCLING SAFETY AND ENFORCEMENT PROGRAMS--WHY THEY FAIL

Efforts of the Auto Club of Missouri in developing a bicycle safety effort are reviewed. Four steps for a viable, successful bicycle safety program are given: determine the goals, develop methods, design a means of evaluation, and acquire reliable consultation. The need for a new awareness of and by bicyclists and motorists is stressed, along with the identity problem of the cyclist. Experiential education for the cyclist is discussed as the most effective means for teaching correct attitudes and motives. An effective course should appeal to the cyclist's sense of community and his social responsibility, his rights, and the risk to others. Enforcement officers or planners should be thoroughly instructed and whenever possible experienced themselves in the problems and purposes of the pro-

gram. Motives and methods of an effective proficiency course are described.

by L. Wuellner
Auto Club of Missouri
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p565-70
1974
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 857

LICENSING OF PEDICYCLE OPERATORS

A statute for licensing pedicycle operators is presented along with a sample true-false written examination and a test of equilibrium for the road test. The preamble indicates the need for better communication among motorists and pedicyclysts sharing a traffic system planned for motor vehicles. The pedicycle is defined to include unicycles, bicycles, tricycles, and quadricycles. The purpose of the licensing process is outlined, emphasizing traffic ethics through education, and the purpose of the regulations is to maintain the flow of traffic. Requirements outlined for pedicycle operators deal with vehicle inspection, rules of the road, and driving practice regulations.

by L. C. Wilson
Empirical Society, 851 N. 26th St., Lincoln, Nebr. 68503
Publ: BICYCLE/PEDESTRIAN PLANNING AND DESIGN, PROCEEDINGS OF THE SEMINAR, New York, 1974 p571-5
1974
Seminar held by Metropolitan Assoc. of Urban Designers and Environmental Planners, 12-14 Dec 1973, at Walt Disney World, Fla.
Availability: See publication

HS-015 858

WET NIGHT VISIBILITY STUDY (ROADWAY [ROADWAY MARKINGS]. REPORT

Apparatus and methods developed for characterization of roadway delineation systems are described, and laboratory and field tests are reported for a selection of 11 retroreflective systems. Plain and textured beaded stripes and four types of retroreflective buttons are included in a full factorial field study covering about 15 miles on Interstate 85 north of Atlanta. Independent photometric methods yielded good correlation in laboratory and field, wet and dry; and the results were in agreement with visual evaluation. Nominal levels of photometric and physical performance of various systems were indicated, and general recommendations for present practices and for additional needed testing procedures are made. Further fundamental and applied research needs are specified.

by W. R. Tooke, Jr.; D. R. Hurst
Engineering Experiment Station, Georgia Inst. of Tech., Atlanta, Ga. 30332
1973 ; 238p 5refs
Prepared for the State of Georgia Dept. of Transp. in cooperation with the Federal Hwy. Administration. Rept. on GDOT Res. Proj. no. 6701.
Availability: Corporate author

HS-015 859

NOISE CONTROL HANDBOOK FOR DIESEL-POWERED VEHICLES. INTERIM REPORT

A handbook to assist the truck fleet operator and the independent truck owner operator in understanding and diagnosing noise problems and in selecting retrofittable components to lower truck exterior and interior noise levels is presented. The handbook includes procedures for identifying acoustic materials, procedures for minimizing exhaust, intake and cooling fan noise, and methods for the minimization of in-cab noise levels. Appendices give standard noise measurement procedures, muffler and intake filter selection data, cooling system design considerations, and a list of known manufacturers of acoustic materials.

by R. J. Damkevala; J. E. Manning; R. H. Lyon
Cambridge Collaborative, Inc., 238 Main St., Cambridge, Mass. 02142
Contract DOT-TSC-587
Rept. No. DOT-TSC-OST-74-5 ; 1974 ; 214p 6refs
Rept. for Oct 1972-Mar 1974 on "Engineering data services on over the road vehicle acoustics and vibration."
Availability: NTIS

HS-015 860

PRIOR VIOLATION RECORDS OF 1447 DRIVERS INVOLVED IN FATAL CRASHES

Driving records were examined for 1447 drivers involved in fatal crashes during a two-year period. The fatal crash involvement rate per 100,000 drivers was found to be higher in approximate proportion to the number of convictions for violations in three years prior to the fatal crash. However, the majority of drivers involved in fatal crashes has no conviction for violations in the prior three years. Drivers with extremely deviant driving records, including so-called habitual offenders, were only a small proportion of drivers involved in fatal crashes and did not have involvement rates as high as other groups, such as drivers under 20 years of age with only a few convictions. It was shown that conviction records and driver characteristics (e.g., age, sex, race) in motor vehicle administration files can be used to identify groups with greater probability of involvement in fatal crashes. It is not possible to identify a small group in the population that accounts for even a modest proportion of all serious crashes. Statistical tables and figures are included.

by L. S. Robertson; S. P. Baker
Insurance Inst. for Hwy. Safety; Johns Hopkins School of Hygiene and Public Health
1974 ; 24p 3refs
Availability: Corporate authors

HS-015 861

COSTS, BENEFITS, EFFECTIVENESS AND SAFETY: SETTING THE RECORD STRAIGHT

The concepts of cost benefit and cost effectiveness are discussed in relation to motor vehicle standards. Since safety standards have no cost per se, they cannot be evaluated either in cost benefit or cost effectiveness terms. It is particular design alternatives available to manufacturers to achieve the objectives of a standard that have societal costs. The various design alternatives can be evaluated. Cost effective designs

should be chosen to minimize societal costs, and until there is evidence that cost effective designs have been chosen, cost benefit studies are premature. Because of the major conceptual and methodological difficulties in the valuation of life and limb, cost benefit studies will be appropriate only in the evaluation of designs not primarily intended to save lives and reduce injuries; i.e., vehicle designs to reduce property damage. Until manufacturers are forthcoming with accurate cost data, neither cost effectiveness nor cost benefit studies in this field can be relied upon. Pending legislation may resolve this problem.

by B. O'Neill; A. B. Kelley
Insurance Inst. for Hwy. Safety, Washington, D. C.
Rept. No. SAE-740988 ; 1974 ; 14p 30refs
Presented at the Automobile Engineering Meeting, Toronto, Canada, 21-25 Oct 1974.
Availability: SAE

HS-015 862

TIRE TRACTION. A MANY FACETED PROBLEM

Many aspects of tire traction are shown. It is emphasized that the overall behavior of all four tires is the most important factor, along with other variables such as moments of inertia, lateral and longitudinal load transfer, steering system elasticity, roll steer and roll camber, and self-aligning torque. Problems related to various test methods are indicated. Introductory consideration is given to four major topics: dry traction, wet traction, hydroplaning, and snow traction.

by H. C. A. van Eldik Thieme
Delft Univ. of Technology, Netherlands
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p1-4
1974
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 863

TIRE WET TRACTION: OPERATIONAL SEVERITY AND ITS INFLUENCE ON PERFORMANCE

Tire wet traction, both cornering and braking, is examined in terms of such variables as speed, pavement texture, and water depth. A concept of Operational Severity is defined as directly proportional to tire speed and water depth and inversely proportional to tire and pavement water drainage capacities. The difficulties involved in assessing tire wet traction performance at a particular speed are outlined. To overcome this problem, an additional factor, the Ultimate Performance Rating (UPR), is defined, based on the full information content of the linear data plot of wet cornering coefficient vs. speed. Tires rated on the basis of UPR under moderate Operational Severity yield performance values that closely correlate with actual available traction under severe Operational Severity. Data showing the UPR correlation with high operational severity traction are used to illustrate how the actual wet cornering traction coefficient and relative ratings based upon it change as water depth varies. This is done for two different pavement textures.

by A. G. Veith; M. G. Pottinger
B. F. Goodrich Co., Brecksville, Ohio
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p5-24
1974 ; 7refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 864

TIRE HYDROPLANING: TESTING, ANALYSIS, AND DESIGN

Water film action between the surface and the tire was photographed for passenger and truck tires by driving and/or pulling a locked tire over a glass plate. These results were correlated with vehicle stopping performance on specially developed water depth controlled surfaces. Normal and tangential unit shearing forces were measured in the footprint under braking and cornering modes on surfaces that were dry or had simulated wet and flooded conditions. A rain laboratory was developed to measure water depths on various road surfaces as a function of cross slope, drainage length, and rainfall intensity. Expected rainfall intensity, frequency, and distribution were collected for all parts of the U. S. Road design data were obtained to determine proper drainage lengths and cross slopes at various points in highway configurations. The data compiled from these studies were gathered to gain an insight into the tire hydroplaning phenomenon and its effect on wet traction in general.

by R. W. Yeager
Goodyear Tire and Rubber Co., Akron, Ohio
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p25-63
1974 ; 5refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 865

TIRE TRACTION ON DRY, UNCONTAMINATED SURFACES

Tire traction on dry pavement surfaces is discussed with emphasis given to the viewpoint of the vehicle tire system engineer. It is indicated that the mechanics of shear force generation assumes greater importance than the detailed mechanisms that control the frictional coupling at the tire road interface. After postulating a working definition to distinguish between the concept of tire traction and the mechanics of shear force generation, the latter process is described in phenomenological terms. Initial, early, and current efforts to define and measure the shear force mechanics of tires in their normative operating condition are briefly reviewed prior to presenting test results obtained in several research programs. These findings relate to: the manner in which the longitudical and lateral components of shear force depend on the longitudinal and lateral components of slip; the shear force/slip relationship as a function of tire geometry and construction; and

the sensitivity of peak lateral force to small amounts of tread shoulder wear.

by L. Segel
University of Michigan, Ann Arbor, Mich.
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p65-98
1974 ; 18refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 866

TIRE TRACTION ON SNOW-COVERED PAVEMENTS

A generalized theory for the traction of a pneumatic tire on a snow covered pavement is presented. A general description of how a tire provides traction on snow is given with several aspects of the complex interaction being presented in detail. These include the snow traction effects of tire carcass, lead edge, tread pattern, and snow expulsion from the tire tread. Snow is then classified on the basis of physical properties that are of importance in snow traction, such as density, snow cover thickness, shear strength of snow itself and of the adhesional bonds at snow-rubber interface, compression force-displacement and shear stress-displacement characteristics, and several coefficients of friction. A general mathematical theory for the traction of a pneumatic tire on snow is developed, taking into account the effect of changes in features of the tread pattern, snow properties, and operating conditions on the level of snow traction.

by A. L. Browne
General Motors Res. Labs., Warren, Mich.
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p99-139
1974 ; 34refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 867

THE SPEED AND TEMPERATURE DEPENDENCE OF RUBBER FRICTION AND ITS BEARING ON THE SKID RESISTANCE OF TIRES

The observation that the ranking of tire tread compounds in skid tests is largely independent of the testing conditions, such as speed, type of surface, whether the surface is dry or wet and whether locked wheel braking or cornering tests are carried out, is explained by means of the temperature and speed dependence of rubber friction. It is shown that speed and temperature are in every case related by the WLF equation, provided the sliding speeds are sufficiently low for the temperature rise in the contact area either to be negligible, or to be known. The range of combined temperature speed variable, achievable in tire skid experiments, is small because of the opposing nature of speed and temperature effects. Because the temperature range is limited on ice, the part of the master curve corresponding to high variable values comes into play. Since in this region the ranking of polymers is reversed, a similar reversal in ranking is also observed in tire skids.

by K. A. Grosch
UNIROYAL European Tire Devel. Center, Aachen, Germany
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p143-65
1974 ; 20refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 868

ELEMENTARY EFFECTS IN THE CONTACT AREA OF SLIDING RUBBER

Visual observation of the contact area of sliding rubber reveals that the motion between the frictional members is often not sliding in the accepted sense. Often motion is by waves of detachment passing along the contact in the same direction as the relative displacement of the rubber. These waves are folds in the rubber surface that are almost certainly produced by buckling. Adhesion appears to be complete between the waves. Buckling is attributed to compressive tangential stresses in the contact area which are theoretically predicted and qualitatively confirmed by experiment. The motive force driving the waves is a tangential stress gradient. The mechanism of wave initiation for hard sliders on rubber tracks is different from that for rubber sliders on hard tracks. The measured frictional force reflects predominantly the energy dissipation accompanying the propagation of the waves.

by A. Schallamach
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p167-78
1974 ; 4refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 869

LUBRICATION STUDIES OF SMOOTH RUBBER CONTACTS

By producing optically smooth spheres and cylinders of rubber, the thickness and the contour of a liquid film between surfaces have been studied by optical interferometry. Normal approach between surfaces clearly shows the entrapment of a bell of liquid and reveals the load bearing capacity of electrical double layer forces at small distances of separation. In the absence of such forces, a liquid film collapses wit, time leading to areas of adhesion over most of the contact region. When a normally loaded rubber sphere is slid tangentially, the entrapped bell lifts up its leading edge to form a convergent wedge of liquid capable of supporting the normal load. Such action gives the horseshoe shaped contour typical of elastohydrodynamic lubrication. The effect of relative spin between contact surfaces has been examined. An unrestrained rubber ball rolled with spin between plates in dry contact experiences tangential contact tractions resulting in a creep motion of the ball perpendicular to its direction of rolling. In the presence of a lubricant, there is still creep, but in the opposite perpendicular direction. Tilt between the contact surfaces

generated by elastohydrodynamic action clearly contributes to this expected result, though it does not fully explain it.

by A. D. Roberts
University of Cambridge, England
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p179-96
1974 ; 26refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 870

AN ANALYSIS OF SOME FACTORS THAT INFLUENCE WET SKID RESISTANCE

Skid resistance of tires on wet roads is calculated based on the analysis of a single sphere, sliding and rolling on water covered rubber. The sphere is taken to be a single scaled up protruberance in the road surface texture. Ignoring interaction effects, each protruberance is seen to contribute to a total drag force on a sliding tire. The analysis uses equations of elastohydrodynamics modified to accomodate the viscoelastic properties of rubber. The properties of the rubber are obtained from an indentation test. The analysis correlates well with experiments using water on rubber except at low sliding speed. Experiments using fluids that wet rubber better than water does show good correlation over the entire sliding speed of the experiments. The conclusion is reached that the skid resistance of tires at low speeds is strongly influenced by the poor wettability of water to rubber.

by B. D. Gujrati; K. C. Ludema
University of Michigan, Ann Arbor, Mich.
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p197-211
1974 ; 8refs
Supported by the National Science Foundation and Uniroyal Inc. Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 871

TREAD COMPOUND EFFECTS IN TIRE TRACTION

Changes in practical compounds have given appreciable improvements in friction on wet surfaces but only minor improvements on dry or icy surfaces. The wet skid resistance of a tread compound is determined primarily by its hardness and hysteresis. Improvements in skid resistance are usually made with a concurrent, predictable, loss in wear resistance for practical compounds. Tire materials research devotes its efforts to development of factors which will permit gains in traction with minimal losses in wear. A typical tire compound is examined for the effects of the ingredients on improvements in wet traction, i.e., raising the glass transition temperature of the polymer or the extender oil, increasing the fineness of the carbon black, and lowering the level of curatives.

by R. F. Peterson, Jr.; C. F. Eckert; C. I. Carr
UNIROYAL Res. Center, Middlebury, Conn.
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p223-39
1974 ; 22refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 872

THE ROLE OF THE TREAD PATTERN--A BLEND OF THE SIMPLE AND COMPLEX

Dry traction and wet traction respond to tread design in opposite fashion. Traction coefficients obtained under dry conditions are lowered by the presence of a tire tread pattern, but are increased by a pattern under wet conditions. The lowering of the friction coefficient on dry surfaces is related to the amount of void area in the total contact patch. Under wet conditions, the vital role of the tread pattern is to facilitate the removal of water from between tread and road surface. This is accomplished by providing localized high pressure points and sharp edges for rapid contact and by providing channels for either water drainage or to serve as water reservoirs. The roles of row number, row width, sipes, groove distribution, and groove angle are reviewed. The complexity of the tread surface picture is reviewed from a hydrodynamic approach.

by R. N. Kienle
UNIROYAL, Inc., Detroit, Mich.
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p241-55
1974 ; 8refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 873

SOME RECENT INVESTIGATIONS INTO DYNAMICS AND FRICTIONAL BEHAVIOR OF PNEUMATIC TIRES

A concise review of dynamic tire response to both in-plane and out-of-plane wheel motions is followed by discussion on special subjects. The possible self-excited in-plane motion of a wheel of which the axle is suspended with respect to the steady moving car body is described. The influence of several parameters such as the rate of change of effective rolling radius with tire deflection, suspension angle, and tire torsional and slip stiffness is indicated. The influence of tire inertia upon out-of-plane tire performance is considered on the basis of theoretical results. The experimentally observed considerable reduction of the first natural frequency of the out-of-plane motion of the tire about a diameter, due to wheel rotational speed, is analyzed. A theoretical explanation is also presented for the creation of a loop in the quasi steady state cornering force characteristics which appeared to occur on wet slippery roads with tires exhibiting certain wear patterns.

by H. B. Pacejka
Delft Univ. of Technology, Netherlands
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p257-79
1974 ; 6refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 874

A TYRE [TIRE] ENGINEER LOOKS CRITICALLY AT CURRENT TRACTION PHYSICS

Tire traction theory is examined from the research engineer's viewpoint of traction physics. Specific topics covered include:

steady state sliding friction of tire tread materials and energy loss concepts; peak friction on braked wheels; micro and macro topographical road features and their consequences in tire behavior; tire tread design features, such as slots, cuts, and sipes, bulk modulus of tread rubber trapped water globules, and three zone contact concept; tire losses under torque conditions and the effective moment arm; and tread reversion phenomena.

by V. E. Gough
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p281-307
1974 ; 6refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 875

THE RELATION BETWEEN THE STRESS SATURATION OF SLIDING RUBBER AND THE LOAD DEPENDENCE OF ROAD TYRE [TIRE] FRICTION

The relationship between tire friction and road texture is briefly outlined. One source of tire friction dependence on load is shown mathematically, with laboratory confirmation, to be due to the stress saturation of the sliding rubber by the surface texture. It is shown that stress saturation occurs when the stress flux in the rubber fails to keep pace with an increasing normal load. This progressively reduces the coefficient of hysteretic friction. Losses in the coefficient of friction from this source can be restored by reducing the normal load, by increasing the gross area of contact or by increasing the Young's modulus of the rubber.

by W. O. Yandell
University of New South Wales, Australia
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p311-23
1974 ; 2refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 876

PAVEMENT SURFACE TEXTURE CLASSIFICATION AND SKID RESISTANCE PHOTO-INTERPRETATION

A pavement surface texture classification method is presented, based on the concept that the pavement surface is a geometrical structure which can be expressed by six parameters: height, width, angularity, distribution, harshness of projections above the matrix from which they arise, and harshness of the matrix itself. Texture classification is a means by which skid resistance measurements, tire wear and noise measurements can be related to identifiable pavement surfaces. Photo-interpretation of skid resistance is discussed. It is the outcome of an empirical approach which resulted in a two-tier model of tire-pavement contact: the pavement surface projections, and the matrix which provides additional tire support to a degree dependent on height, distance between the asperities, and tire construction. The role of pavement texture classification in the surveillance of pavement slipperiness is discussed.

by R. Schonfeld
Ontario Ministry of Transportation and Communications, Downsview, Ont., Canada
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p325-38
1974 ; 4refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 877

AN APPROACH TOWARDS THE UNDERSTANDING AND DESIGN OF THE PAVEMENT'S TEXTURAL CHARACTERISTICS REQUIRED FOR OPTIMUM PERFORMANCE OF THE TYRE [TIRE]

A theoretical approach to optimize the potential real area of contact between the rolling tire and the pavement while maintaining adequate water drainage is discussed. The resulting macro-texture recommendation is shown to produce lower tire noise and superior ride characteristics to other surfaces with similar levels of water dissipation. The minimum level of micro-texture is related to the thickness of the water film; increasing levels of micro-texture are shown to increase tire wear without a proportional increase in the wet friction. Direct observation of micro-texture characteristics of various aggregates has led to levels of maximum and minimum levels of micro-texture being suggested. The concepts of micro- and macro-texture optimization have been applied to a new form of wearing course mix design currently undergoing road trials. The experimental results are used to support the theoretical approach. Some aspects of tire design are also discussed.

by R. Bond; G. Lees; A. R. Williams
Dunlop Tyre and Rubber Co., Birmingham, England
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p339-60
1974 ; 19refs
Prepared in cooperation with the Dept. of Transp. and Environmental Planning, Univ. of Birmingham, and Dunlop Ltd. Part of this paper is included in the doctoral dissertation of R. Bond. Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 878

AN ANALYSIS OF THE LITERATURE ON TIRE-ROAD SKID RESISTANCE

Tire road skid resistance literature is reviewed in a summary of major findings and conclusions up to 1970. The summary is designed to assist researchers in quickly understanding the different findings and landmark publications of various aspects of the subject. Pavement texture, speed, traction, ice and snow, tread materials, road surface design, and measurement techniques are covered.

by K. C. Ludema; B. D. Gujrati
University of Michigan
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p377-84
1974 ; 71refs
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 879

THE PHYSICS OF TIRE TRACTION: A REVIEW OF CURRENT THEORY

Current theory of tire traction physics is summarized by a review of the papers presented at the symposium. Session One of this symposium focused on a general description of tire traction phenomena, including the different requirements necessary for good traction performance in the principle operating environments (i.e., weather conditions as well as dynamic state of the traction demand situation). Fundamental mechanisms of rubber friction and their contribution to tire traction were considered in Session Two, which included viscoelastic behavior of tread compounds, adhesive friction, and adhesive contact in the presence of a lubricant. The third session emphasized the role of the tire in the production of traction, dealing with tire tread pattern and compound, tire carcass and size effects, photo interpretation of surface texture, and vehicle load effects.

by A. L. Browne
General Motors Res. Labs., Warren, Mich.
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p385-90
1974
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 880

FUNDAMENTAL ASPECTS OF RUBBER FRICTION. PANEL DISCUSSION

Rubber friction is examined by a panel of conference participants. Topics covered include: large friction coefficients in tire skid experiments; icy road contact; lubrication film thickness; water film measurement; wet and dry contact differences; rubber adhesion on lubricated tracks; viscoelasticity; waves of detachment; surface texture and temperature; friction as an energy dissipation mechanism; hysteresis; and mathematical models.

by K. A. Grosch; K. C. Ludema; D. F. Moore; A. D. Roberts; A. Schallamach
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p213-20
1974
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 881

TIRE TRACTION--THE ROLE OF THE PAVEMENT. PANEL DISCUSSION

Tire traction and the role of the pavement is discussed by a panel of conference participants. Topics covered include: mathematical models; adhesion and friction; lubrication; speed effects; hysteresis; energy dissipation processes; stress saturation; deformational loss; pavement texture effects; tread patterns; wet traction; tread compounds; surface properties; micro- and macro-texture; pavement materials; and vehicle cornering performance.

by K. C. Ludema; D. F. Moore; R. Schonfeld; A. R. Williams; W. O. Yandell
Publ: PHYSICS OF TIRE TRACTION: THEORY AND EXPERIMENT, New York, 1974 p361-76
1974
Presented at the Symposium on the Physics of Tire Traction, Warren, Mich., 8-9 Oct 1973.
Availability: See publication

HS-015 882

IMPROVEMENTS NEEDED IN PLANNING AND USING MOTOR SAFETY RESEARCH. NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

An evaluation of the research and development activities which support the promulgation of Federal motor vehicle safety standards in the National Highway Traffic Safety Administration is presented. It was found that closer coordination between the Research and Development Office and the Motor Vehicle Program Office was needed, that unresolved disagreements on the approach to be taken to certain research problems caused priorities to be disregarded, that the Safety Administration should prepare a planning document delineating research needed to support future safety standards, and that the Safety Administration did not promptly use research contractors' findings to develop safety standards or contract for additional research when considered necessary. The conduct and progress of the Experimental Safety Vehicle Program is reviewed with regard to its chronology, the safety standards exceeded by ESV specifications, the safety performance of various parts or components of prototypes, and additional ESV studies in progress. It is recommended that the Safety Administration should: develop a coordinated program plan for establishing safety standards which delineates the research requirements for each standard and periodically update the plan; monitor the plan's implementation and resolve any differences arising between research offices and rulemaking offices; critically evaluate research findings and determine the extent to which they can be used for rulemaking; and insure that the Motor Vehicle Program Office promptly uses contractor's research findings, if determined to be feasible and desirable, to develop safety standards, or obtains any additional research needed to support rulemaking on a priority basis.

General Accounting Office
Rept. No. B-164497(3) ; 1974 ; 59p
Prepared for the United States Senate Com. on Commerce.
Availability: Comptroller General of the U. S., General Accounting Office, Washington, D. C. 20548

HS-015 883

PETROLEUM PITCH AS A PLASTICIZER FOR SBR AND SBR BLENDS

The results are reported of a study of the utilization of two petroleum pitch products in tire and other rubber systems. It was shown that both pitches imparted to the vulcanizates pronounced physical property changes not encountered with the usual extender oils or plasticizers (increased hardness, greater stiffness, higher heat build-up, etc.). This led to a study of the specific interactions between certain of the pitch

components and carbon black. These solid pitch materials can be used alone as plasticizers or in combination with conventional aromatic extender oils, and they offer improved qualities including lower rebound properties. Increased heat buildup can be reduced by lowering the pitch content. Pitch migration from tread to carcass in a simulated tire cross section appears to be very low compared to that of aromatic extender oil.

by M. L. Deviney; E. J. Weaver; W. H. Wade; J. E. Gardner
Publ: RUBBER CHEMISTRY AND TECHNOLOGY v47 n4 p837-48 (Sep 1974)
1974 ; 26refs
Presented at a joint meeting of the Rubber Div., American Chemical Society and the Macromolecular Science Div. of the Chemical Inst. of Canada, Toronto, Ont., Canada, 7-10 May 1974.
Availability: See publication

HS-015 884

ENERGY LOSSES IN TIRES

Tire rotation is impeded by a drag force of 10 to 20 lb per 1000-lb load in normal vehicle operation. The principal cause is hysteresis, which is a function of the viscoelastic properties of the rubber and cord components, the way these materials are used in the tire, and the way the tire is operated. The influence of material properties is considered along with tire construction as it related to energy loss. This subject is developed by consideration of the forces and moments involved in tire operation and of the mechanisms of energy loss. The importance of service conditions is emphasized by a discussion of the factors influencing rolling resistance. Tire rolling losses can be an important fraction of the total power consumption in low-powered vehicles. Future trends in tire engineering and their effects on rolling resistance are discussed.

by J. D. Walter; F. S. Conant
Firestone Tire and Rubber Co., Akron, Ohio 44317
Publ: TIRE SCIENCE AND TECHNOLOGY v2 n4 p235-60 (Nov 1974)
1974 ; 40refs
Presented at the American Society for Testing and Materials Com. F-9 on Tires Symposium on Tires and Fuel Economy, Dearborn, Mich., 8 May 1974.
Availability: See publication

HS-015 885

POWER REQUIREMENTS OF TIRES AND FUEL ECONOMY

Torque input of a pneumatic tire in various operating models is analyzed and the tests required to determine the energy consumption of a tire are discussed. The effects of most operating variables (e.g., slip angle, longitudinal slip, vertical load, speed, tire type) are illustrated by data obtained on the Calspan Tire Research Facility. The energy expended by the tires is combined with other vehicle losses, and the magnitude of possible fuel savings by the use of low loss tires is estimated.

by D. J. Schuring; K. D. Bird; J. F. Martin
Calspan Corp., Buffalo, N. Y. 14221
Publ: TIRE SCIENCE AND TECHNOLOGY v2 n4 p261-85 (Nov 1974)
1974 ; 8refs
Presented at the American Society for Testing and Materials Com. F-9 on Tires Symposium on Tires and Fuel Economy, Dearborn, Mich., 8 May 1974.
Availability: See publication

HS-015 886

TIRE TESTING FOR ROLLING RESISTANCE AND FUEL ECONOMY

The rolling resistance of tires and the fundamental factors influencing rolling resistance during laboratory and road testing are discussed. Test methodologies for vehicle fuel consumption, vehicle coast down, rolling resistance trailer measurements, and laboratory testing are described. Passenger tire characteristics only are considered as the paper deals primarily with test techniques, along with tire construction, the effect of environment, comparison of test methods, test parameter effects, and the interrelationships between various test models.

by D. A. Glemming; P. A. Bowers
Goodyear Tire and Rubber Co., Akron, Ohio 44316
Publ: TIRE SCIENCE AND TECHNOLOGY v2 n4 p286-311 (Nov 1974)
1974 ; 4refs
Presented at the American Society for Testing and Materials Com. F-9 on Tires Symposium on Tires and Fuel Economy, Dearborn, Mich., 8 May 1974.
Availability: See publication

HS-015 887

EUROPEAN FORD 4 CYLINDER IN-LINE SINGLE OHC ENGINES

The complete range of four cyl. in-line SOCH engines produced by Ford in Europe is described. The engine, which is available in three displacements of 1.3, 1.6, and 2.01, has been developed to offer a high standard of reliability, competitive performance, and compliance with various current exhaust emission regulations. Significant design features of all the major engine components are discussed, together with certain special features which are necessary to control exhaust emissions.

by J. A. Morgan; D. J. Stojek
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p1-13
Rept. No. C314/73 ; 1973 ; 1ref
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 888

ENGINE CASTINGS

The castings used on passenger car engines, both ferrous and light alloy, are surveyed, and the foundry processes necessary to mass produce such castings are described. Cylinder block

and head castings are analyzed in detail and design proposals submitted that will enable cleaner and technically superior castings to be supplied by the foundry; emphasis is on casting design. The advents of the nodular iron crankshaft in mass production and the potential of nodular iron connecting rods are discussed. The engineering costs of castings, when large and small engines are designed for the same production line, are briefly mentioned.

by J. C. Clayton
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p14-23
Rept. No. C315/73 ; 1973 ; 8refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 889

BASIC PROPERTIES OF CYLINDER HEAD GASKETS UNDER STATIC AND DYNAMIC STRESS

Cylinder head design and gasket material selection are discussed with emphasis on observation of the fundamental relations between forces and deformations of sealing joints. A new bolt elongation force diagram is described which is derived from the known load deformation diagram by which it is easy to determine the forces and deformations of the different parts of the cylinder head sealing joints under static and dynamic stress. The dynamic properties of cylinder head gasket materials could be determined by using a newly developed hydraulic simulator. These dynamic properties can be included in an approximate calculation of the sealing gap variation due to periodically alternating internal forces.

by G. Stahl
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p24-31
Rept. No. C316/73 ; 1973 ; 3refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 890

THE ENVIRONMENT, PETROL, THE CAR AND THE COST

Efforts to improve the environment by measures to reduce exhaust emissions are discussed, including legislation limiting the use of certain petrol components such as lead anti-knock compounds. A profile is presented of the effects of these restrictions on future petrol quality and costs. The implications on engine design, car performance, and operating costs are outlined.

by D. Ellis; J. D. Savage; E. H. Spencer
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p32-40
Rept. No. C317/73 ; 1973 ; 12refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 891

VALVE AND VALVE MECHANISMS: DESIGN AND BEHAVIOUR

The general aspects of valve mechanism design and the ways in which the design limitations affect performance are discussed. The problems of high speed operation are described and illustrated with recordings of the vibration in real systems. Methods of obtaining measurements of the dynamic performance are described, and it is shown how these relate to the life of components. The vibration may be reduced in three ways: design of components in the valve train; design of the cam profile; and matching the cam profile to the dynamics of the system. All three methods are detailed and illustrated.

by P. R. Wagstaff; G. G. Lucas
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p41-9
Rept. No. C318/73 ; 1973 ; 14refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 892

PLAIN BEARINGS IN THE PASSENGER CAR ENGINE

The classical bearing parameters are discussed in terms of trends which demand greater attention to detail and consideration of interacting situations than has been necessary in the past. They include: the continuous pressure to reduce costs by using cheaper materials, larger tolerances, and less skilled labor; the general deterioration in the standard of labor and responsibility attitudes; the increase in oil temperatures without an accompanying improvement of viscosity improvers and additives; and an increasing failure by engineers to pass on accumulated know-how.

by R. H. Spikes
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p50-9
Rept. No. C319/73 ; 1973 ; 6refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 893

A PRIMARY NOISE GENERATION MECHANISM IN PETROL ENGINES

Investigations into the noise characteristics of gasoline engines leading to the development of a general hypothesis explaining structural excitation of reciprocating engines are described. The major conclusion is that noise is controlled by crankshaft movements in space and by the behavior of the lubricating oil film in the main journal bearings. Consideration was given to the effect of speed, combustion, structural and mechanical excitation, dynamic variation of the clearance dimension and of oil film pressure.

by J. A. Raff; E. C. Grover
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p60-72
Rept. No. C320/73 ; 1973 ; 9refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 894

DYNAMIC SEALING

Problems of the internal combustion engine in dynamic sealing which are different from and often more difficult than those encountered by the design engineer in other branches of mechanical engineering are discussed. Principle conditions affecting the seal installation are outlined and compared with electric motor driven vehicles. Details are given for valve stem seals, water pump seals, crankshaft design, front end crankshaft and auxiliary drives, and seal materials. It is shown that none of the three heat resisting materials discussed has a full complement of excellent properties (i.e., elastic properties, heat resistance, cold, fluid resistance, processing, handling, and cost), but that silicone comes closest to meeting the requirements. The need for collaboration between the designer and seal manufacturer is stressed.

by E. T. Jagger
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p73-6
Rept. No. C321/73 ; 1973
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 895

PASSENGER CAR ENGINES: NEW MATERIALS AND METHODS

Using examples in current manufacture, the paper illustrates developments in materials and processes in engines for passenger vehicles. Three basic factors are cited as dictating change and promoting development: technical, economic, and ecological or social factors. Details are given for casings, including: crankshafts, camshafts, and rotor shafts; plastic and composites. The outlook for the future is examined. It is concluded that in the longer term, environmental considerations of production and usage from obnoxious emissions, noise, vehicle overcrowding, depletion of material and fuel resources, must affect the overall design of the vehicle, including the engine.

by E. A. G. Croom
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p77-84
Rept. No. C322/73 ; 1973 ; 6refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 896

AVENGER ENGINE: A DESIGN CONCEPT FOR MANUFACTURE

The Avenger engine is described with focus on the cooperation among design and development, manufacturing, and technical cost functions. Engine performance is not discussed in detail, but consideration is given to the design aspect of individual components from the manufacturing standpoint. Details are given for the cylinder block, crankshaft, connecting rod, pistons, cylinder head, and general design parameters as well as the compression ratio.

by L. Kuzmicki; J. G. Haig
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p85-95
Rept. No. C323/73 ; 1973
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 897

PRODUCTION ENGINEER'S VIEWPOINT

The general reasons for the introduction of a new or modified version of an engine are given. The importance of early involvement of the production engineer is stressed, especially when long lead times are required for buying new machine tools and process equipment. This involvement becomes more critical when the design changes are mandatory, as with safety or pollution controls. The responsibilities of the production engineer are outlined, and determination of the type of plant and equipment to be used is effected. The phasing in of new projects is examined, with consideration of the problems of producing two versions of a part at the same time. The appointment of a production engineer is proposed to coordinate efforts with the design department on future projects, and an outline of what the designer should avoid is also given.

by S. Friesner
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p96-102
Rept. No. C325/73 ; 1973
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 898

PISTONS AND PISTON RINGS FOR PASSENGER CAR ENGINES

Explanations of piston and piston ring techniques are discussed. The worldwide introduction of anti-pollution regulations is shown to lend new weight to the use of new properties and concepts in the solution of conditions which in the past have been accepted as unavoidable. This will bring about modifications of engines reflecting on piston and piston ring design. The diesel engine for passenger cars will gain increased popularity because it already complies with existing exhaust emission control regulations and has a better fuel economy. The diesel engine is no longer substantially more expensive than a gasoline engine which is equipped with all emission control devices required. The additional demands upon pistons and piston rings can be met at reasonable cost.

by M. Rohrle
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p103-9
Rept. No. C326/73 ; 1973
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 899

BRAKING REGULATIONS IN EUROPE

In view of important new braking regulations for motor vehicles and trailers recently introduced in Europe, the relevant rulemaking procedures and the international organizations which provide for industry participation are described. The technical content of these regulations is summarized and specific examples of difficult, interesting, or unusual demands are highlighted. Some comparisons with the appropriate U. S. federal standards are included, and the European method of type approval is explained against the background of self-certification in the U. S. Several new European proposals for tractor/trailer compatibility, brake apportioning, and antiskid systems are reviewed to illustrate the current status of legislative progress in Europe.

by P. Oppenheimer
Girling Ltd. (England)
Rept. No. SAE-740313 ; 1974 ; 24p 10refs
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.
Availability: SAE

HS-015 900

CARBURATION AND MIXTURE PRETREATMENT IN THE MERCEDES-BENZ TWIN CAMSHAFT IN-LINE ENGINE

Development by Daimler-Benz of in-line engines of 2.8 liter piston displacement is described. They have technically sophisticated design characteristics, such as twin overhead camshafts, cross-flow cylinder head, extensive counterbalancing, and combustion chambers designed with emission control in mind, as well as a dual compound carburetor with constant de-pressure secondary stages. Although allowances had to be made for 1972 gasolines with low lead content and poorer antiknock properties, a much higher performance has been achieved as well as extensive exhaust cleaning and smoother running.

by H. P. Lenz
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p119-25
Rept. No. C341/73 ; 1973 ; 13refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 901

IGNITION AND ELECTRONIC INJECTION CONTROL FOR THE FUTURE

It is suggested that the inherently simple internal combustion engine still has a future if simplicity in engine design is maintained, and that electronics can be used to control the thermodynamic process more closely. General considerations of the Otto engine are offered. Since pollution and efficiency have become more important factors, the Otto process will have to meet more stringent requirements in the future. Improvements in the process parameters are introduced, leading to the close examination of functional relationships. One conclusion is that research in the lean fuel mixture is promising. An indication is that a more versatile and precise process control is desirable and that the inclusion of a feedback from the exhaust composition will be helpful in compensating for slow deviations in the process conditions.

by H. G. Bruijning; W. J. Kleuters; P. J. Poolman
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p126-32
Rept. No. C342/73 ; 1973 ; 4refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 902

A DESIGNER'S VIEWPOINT

Objectives are specified for the design of vehicle engines. Design considerations and methods applicable to major engine components are discussed from a mechanical designer's viewpoint. Specific topics covered include performance, installation, production and product quality. Mechanical design is detailed in terms of cylinder head, valve train and timing drive, cylinder block, crankshaft and bearings, connecting rod, cooling circuit, and lubrication system. The impact of legislation is mentioned.

by H. W. Barnes-Moss
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p133-47
Rept. No. C343/73 ; 1973 ; 11refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 903

LUBRICATING OILS FOR PASSENGER CAR ENGINES

The lubricant is described as a critical component of passenger car engines, affecting the performance of many other components. The ability of the lubricant to fulfill its functions is very dependent on engine design and usage. Trends in engine design to meet the requirements of legislation on atmospheric pollution will place restrictions on the lubricant. A critical factor is likely to be an increase in the temperature range over which the oil has to function satisfactorily and a higher maximum working temperature. Some of the problems will be partially alleviated by the use of unleaded or lower lead content fuels, but restrictions on the composition of the oil are expected to make the task of formulating satisfactory oils difficult. Synthetic oils offer little advantage over mineral oils; the new hydrocarbon oils with higher viscosity indices than those previously available provide the basis for a further advance in lubricating oil technology. New types of additives, such as the VI improvers, also help provide the oil technology to meet future needs. Cooperation with the oil and motor industries will ease many of the joint problems.

by A. B. Webster
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p148-55
Rept. No. C344/73 ; 1973 ; 11refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 904

DESIGN, OPERATION AND TESTING OF AIR AND OIL FILTERS

The variety of design and separation principles applied to filtration, their possible advantages or limitations, and future trends are reviewed. Some of the less obvious factors recommended for consideration in test evaluation are illustrated. Filtration investigation following the change to dispersant oils has shown that instantaneous efficiency and filter stability may be considered more important than cumulative efficiency. These evaluations can be determined by procedures included in the recently published BSI Standard BS-4836. Interpretation of test results and application to filter design and operation is reviewed.

by K. E. Buckman
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p156-64
Rept. No. C345/73 ; 1973 ; 1ref
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 905

INFLUENCE OF VEHICLE REQUIREMENTS ON ENGINE DESIGN

The influence of vehicle requirements on engine design is reviewed from a historical perspective, and some vehicle design configurations are discussed. Alternative combinations of engines, gearboxes, axles, luggage trunks, and occupant spacings are outlined along with engine types available, such as internal combustion, gas turbine, electric, and steam. The advent of legislation and rising social pressures are discussed, as well as other factors related to design, including capital investment, safety, standards of living, convenience, environmental considerations, technological advances, and marketing requirements.

by R. N. Oxley
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p165-78
Rept. No. C346/73 ; 1973
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 906

DEVELOPMENT OF A HIGH SPEED FOUR-CYLINDER DIESEL ENGINE UNDER CONSIDERATION OF THE EXISTING MACHINE-TOOLS EQUIPMENT FOR THE PRODUCTION OF THE GASOLINE ENGINES

Work is outlined which has resulted in the production of the 2.1 liter series diesel engine which, when installed in a car of 1.210 Kp, gives an extremely good driving impression. Various press comments have indicated that the high power-to-weight ratio of the car, combined with the good shape torque curve completely eliminates the reputation of a tired diesel. Future use will confirm that the diesel motor can give good driving and handling characteristics and cost factors comparable with a gasoline engine.

by H. Weitzel
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p179-87
Rept. No. C347/73 ; 1973
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 907

INFLUENCE OF VEHICLE REQUIREMENTS ON ENGINE DESIGN

A systematic survey and a detailed analysis of all the most significant factors which govern the designer's choices from general engine configuration to the design of individual components is made. Among the most significant factors which govern the designer's choice are: marketing factors, including engine capacity, number and layout of cylinders, engine position, stroke-bore ratio; valve gear; production factors, such as minimization of plant costs; rationalization of design and manufacture, including foundry practice, machining limitations, and ease of assembly and service; materials--metals vs. plastics; legislation; and computer aided design.

by A. Lampredi
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p188-97
Rept. No. C348/73 ; 1973
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 908

DEVELOPMENT AND DURABILITY TESTING AND DATA RETRIEVAL

Available techniques of durability testing are reviewed and the different functions and categories involved are outlined. Key requirements are defined as repeatability, security, efficiency, and data retrieval. Implementation of these requirements is achieved by control, sequencing, measurement, recording, processing, and alarms. Each of these methods are examined in detail. It is shown that the use of digital techniques brings increased accuracy, improved control flexibility of approach, and improved reliability. It is concluded that use of the digital computer will provide the most economic solution to testing problems.

by G. A. Watson; M. E. Brookes
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p198-204
Rept. No. C355/73 ; 1973
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 909

A STUDY OF THE LUBRICATION AND WEAR OF THE APEX SEAL AND TROCHOID IN THE WANKEL ENGINE

Starting from a demonstration of the wear situation of the apex seal and trochoid components, in its dependence on different apex seal materials and the operating conditions, it was shown that the high wear rate of running surfaces was caused primarily by poor lubrication conditions. Of particular significance was the influence of the fuel and its lead content upon the high wear rate of the apex seal and trochoid under the cold running condition. By measurement of electrical contact resistance between wear during cold running and poor lubrication conditions. The future development of the Wankel engine relative to seal wear reduction is forecast.

by F. Stecher
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p205-12
Rept. No. C356/73 ; 1973 ; 2refs
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 910

THE TYPE 907 LOTUS 2 LITRE ENGINE

The original engine concept for the Type 907 Lotus two liter engine, decided upon before the more stringent specification requirements were enacted, has proved successful in providing a reliable, high performance, low pollution engine, free from complex regulation beating accessories. The effectiveness of a number of decisions dictated by extreme expediency in combining to produce an acceptable solution is noted. It is suggested that the same emission results could probably have been achieved with a three-valve engine using two exhaust valves.

by A. C. Rudd
Publ: INSTITUTION OF MECHANICAL ENGINEERS CONFERENCE PUBLICATION 19, London, England, 1973 p213-23
Rept. No. C357/73 ; 1973
Presented at Conference on Passenger Car Engines, Nov 1973.
Availability: See publication

HS-015 911

PROCEEDINGS OF THE NATIONAL CONFERENCE ON THE AGING DRIVER, WASHINGTON, D. C., May 2-4, 1974

Persons representing many different interests and disciplines were invited to participate in the Conference and every effort was made to have them think of the aging driver in the broadest community terms. Conference papers on various factors related to aging drivers are presented. Most of the papers printed herein have been slightly edited and abridged. Topics include: licensing procedures; retraining the elderly driver; specific medical considerations; alcohol and aging; age and driver fitness; loss of mobility in an automotive society; role of the family physician; allied and related aspects; transportation in the community; and medical limitations and the elderly driver.

American Medical Assoc., 535 North Dearborn St., Chicago, Ill. 60610; American Assoc. of Motor Vehicle Administrators, 1201 Conn. Ave., N.W., Washington, D.C. 20036
1974 ; 118p refs
Includes HS-015 912--015 921. Supported by the Automotive Safety Foundation--Hwy. Users Federation.
Availability: Health and Safety Associates, P. O. Box 222, Morton Grove, Ill. 60053 $3.00

HS-015 912

LICENSING PROCEDURES

Several conference participants offer comments on licensing procedures as they affect the aging driver, agreeing that chronological age should not be used to place all drivers of a certain age group in a class representing those in need of special treatment or surveillance. The size of the aged driver population is described along with problems caused by a small minority. Development of a reporting procedure is advocated to bring impaired drivers to the attention of the licensing agency in a more expeditious manner. Vision testing and screening are cited, and recommendations are given for helping licensing agencies differentiate between persons who are qualified or not qualified to drive, including training personnel, orienting physicians, working with aged citizen groups, granting restricted licenses, and using computer facilities. Procedures followed by several states are outlined.

by E. M. Syring; M. Hodgson; B. Y. Scott; R. Baldwin
Publ: HS-015 911, NATIONAL CONFERENCE ON THE AGING DRIVER, Washington, D. C., 1974, Proceedings p13-22
1974
Availability: In HS-015 911

HS-015 913

RETRAINING THE ELDERLY DRIVER

A Michigan State University research study to determine whether 611 older drivers' accident record data would differ when separated into various age, sex, and residency categories is summarized. The study shows that: the senior drivers have a slightly higher accident rate than the national senior driver rate; male senior drivers between the ages of 65-69 who live in an urban area are more likely to be involved in an accident; the drivers are more likely to have only one accident during a five-year period; the majority of senior drivers involved in an accident are at fault; a majority of senior driver accidents involved a fatality; being under the influence of alcohol is not a major contributing factor in senior driver accidents; senior drivers use their automobiles throughout the year. However, data is limited in that all situations encountered by senior drivers were not related to real-world driving situations. There is a need for criteria to measure performance in a reliable and valid way before retraining programs can be structured.

by R. O. Nolan
Publ: HS-015 911, NATIONAL CONFERENCE ON THE AGING DRIVER, Washington, D. C. 1974, Proceedings, p23-6
1974 ; 2refs
Availability: In HS-015 911

HS-015 914

SPECIFIC MEDICAL CONSIDERATIONS

Medical factors related to licensing aging drivers are reviewed, with emphasis on three specific areas: visual, cardiovascular, and mental. General loss of strength, coordination, reflexes, and hearing come gradually. Mental and emotional aspects of the elderly driver's performance and behavior are an important facet. Screening examinations administered by the state licensing authorities are suggested which would include visual acuity, glare recovery, hearing, general body movements, reflexes, blood pressure, pulse rate, shortness of breath, weight loss, and psychological tests designed to determine judgment. If a serious impairment were evident, the license would be denied until a physician gave the applicant a clean bill of health.

by K. A. Sears; R. A. Winstanley; A. J. Brown; W. K. Keller
Publ: HS-015 911, NATIONAL CONFERENCE ON THE AGING DRIVER, Washington, D. C., 1974, Proceedings, p27-33
1974
Availability: In HS-015 911

HS-015 915

ALCOHOL AND AGING

The use of alcohol by aging drivers is discussed as a cultural likelihood and in terms of requirements needed to be fulfilled before a sanctioning system will start to have any significant impact on the behavior of drinking drivers. It is suggested that as physical deterioration due to aging progresses, most well-adjusted people accommodate their drinking to the situation, and that society must see that this satisfactory adjustment is maintained as aging advances. The requirements advocated include: awareness or basic knowledge and understanding of the law; early detection and immediate correction of unlawful behavior; legitimacy or fairness of the law; and satisfaction of basic needs of the driver. Alternatives to satisfactions provided by driving might be free, convenient public transportation, Dial-a-Bus services, residential gathering places, or giving a feeling of power, status, and freedom through other means.

by R. F. Borkenstein; H. Klette
Publ: HS-015 911, NATIONAL CONFERENCE ON THE AGING DRIVER, Washington, D. C. 1974, Proceedings p35-8
1974
Availability: In HS-015 911

HS-015 916

AGE AND DRIVER FITNESS

It is shown that some elderly drivers constitute a high risk group. While individual differences are great, psychophysiological and psychological deterioration begins at about age 55, showing a marked increase in later years, especially for certain functions related to driving, intellectual judgment, and personality. Aging drivers and beginners have specific traffic problems. Suggestions are made to ameliorate these difficulties wherever possible, and to exclude incompetent drivers from active traffic participation if readjustment is no longer possible.

by E. Klebel
Publ: HS-015 911, NATIONAL CONFERENCE ON THE AGING DRIVER, Washington, D. C., 1974 Proceedings p39-46
1974 ; 19refs
Availability: In HS-015 911

HS-015 917

LOSS OF MOBILITY IN AN AUTOMOTIVE SOCIETY

The transportation needs of the elderly are discussed in terms of the need for mobility in U. S. society. Facts and fallacies about aged drivers as high risks are reviewed, and the importance of mobility is stressed. A more rational approach to city planning, license examination, medical evaluation, treatment, and driver retraining is advocated. It is suggested that the scientific and medical community must be encouraged to apply its talents and techniques to this problem which will become more severe as the absolute number and percentage of over-60 persons continue to grow, and the percentage of over-60 drivers grows even faster.

by E. L. Wiener
Publ: HS-015 911, NATIONAL CONFERENCE ON AGING AGINE DRIVER, Washington, D. C., 1974 Proceedings p47-54
1974 ; 10refs
Availability: In HS-015 911

HS-015 918

ROLE OF THE FAMILY PHYSICIAN

The role of the family physician in defining the need for restricting, and sometimes discontinuing, the driving privilege of the aging driver is probably much more limited than generally visualized. Determination as to whether or not to deny or restrict the drivers license should involve the applicant, administrator and physician. A small percentage of aging drivers should be denied licensure because of functional impairment, but the evaluation of most will be more appropriately made by a driving test. It is suggested that this driving test should be required at each renewal beyond a certain age to be defined in each state.

by J. L. Weygandt
Publ: HS-015 911, NATIONAL CONFERENCE ON THE AGING DRIVER, Washington, D. C., 1974, Proceedings p55-8
1974
Availability: In HS-015 911

HS-015 919

ALLIED AND RELATED ASPECTS

The aged driver question is examined in terms of insurance, organizations, and legislation. It is noted that the insurance industry has considered the aging driver as a marginal risk for auto insurance, but that this attitude seems to be changing and that evidence has begun to surface that questions the assumption that elderly drivers are high accident risks. The impact of the adoption of no-fault insurance on the age problem is also examined, along with the restriction on tort recoveries. Transportation is cited as one of the most important needs of the el-

derly, especially in suburban areas yet mobility in every facet of our society should not be overlooked.

by D. J. Flaherty; K. E. Hultgren
Publ: HS-015 911, NATIONAL CONFERENCE ON THE AGING DRIVER, Washington, D. C., 1974, Proceedings p59-63
1974 ; 1ref
Availability: In HS-015 911

HS-015 920

TRANSPORTATION IN THE COMMUNITY

The transportation problems of the aged in the community are discussed in terms of their life style. The health of the aged is dependent on their mobility, which is proportionate to their capability as pedestrians and the availability of public and private transport. Those aged most in need of medical care are least likely to obtain it. The new outreach programs, such as home health agencies, geriatric outreach programs, transportation to day centers and hospitals are all relatively new, reach small numbers, and suffer from inadequate financing. With adequate public and private support, some integrated method of dealing with the transportation problems of the aged can evolve.

by M. Rodstein
Publ: HS-015 911, NATIONAL CONFERENCE ON THE AGING DRIVER, Washington, D. C., 1974, Proceedings p65-70
1974 ; 9refs
Availability: In HS-015 911

HS-015 921

MEDICAL LIMITATIONS AND THE ELDERLY DRIVER

Many elderly drivers markedly alter their driving patterns toward lower annual mileage and exposure to less hazardous driving environment. As a group, the elderly have higher crash risk per unit of exposure, largely attributable to inadequate adjustment by those drivers with medical impairment. Using direct observation and simple screening techniques, it is probably possible for motor vehicle examiners to identify most of the high risk elderly drivers at time of re-licensing without the necessity of requiring periodic medical examinations. Additional drivers with deterioration of skills can be identified through driving record checks. Inadequate information about transportation needs, capabilities and resources associated with the aging process can be corrected only through substantial research.

by J. A. Waller
Publ: HS-015 911, NATIONAL CONFERENCE ON THE AGING DRIVER, Washington, D. C., 1974, Proceedings p71-84
1974 ; 22refs
Availability: In HS-015 911

HS-015 922

ANALYSIS OF MOTOR CARRIER ACCIDENTS INVOLVING VEHICLE DEFECTS OR MECHANICAL FAILURE, 1972

Summary tables are presented of national highway accident statistics, based on accident reports which indicated that a mechanical defect or failure was a causative factor. Part One of the report deals with bus data, and the 25 accidents reported in 1972 are a substantial decrease from the average of 40 over the four previous years. The various types of mechanical failures include major assemblies, rollaways, steering assembly, brake systems, wheels and tires, transmission, suspension, and electrical. Part Two contains 23 similar statistical tables dealing with trucks.

U. S. Dept. of Transportation, Bureau of Motor Carrier Safety
1974 ; 26p
Availability: Corporate author

HS-015 923

ADVISORY NOTE ON HEADLAMP ELECTRICAL SYSTEM PERFORMANCE

A statistical sampling was made of the voltage across vehicle headlamp terminals at engine speeds of 1000, 1500, and 2000 rpm. The averages for the 50 car sample were 11.66 volts when all accessories were switched on, and 12.75 volts when all accessories were switched off. The variation in seeing distance corresponding to the measured voltage deviations can be upwards of 100 feet. This suggests that regulatory authorities should examine the technology achievements in headlamp electrical systems to determine whether the voltage regulation can be improved and how the operational deviations might be catered for in headlamp performance evaluations and type comparisons.

by R. Blais; H. F. L. Pinkney; A. H. Hall
National Research Council Canada, Ottawa
Rept. No. LTR-ST.730 ; 1974 ; 24p
French summary.
Availability: Corporate author

HS-015 924

SPEED AND ACCIDENTS. A PRELIMINARY REPORT

In an examination of the speed factor, it is found that speed is not necessarily an important cause of accidents, but that road conditions, traffic volume, and speed variance may be more important. Speed is an important determinant of accident severity. Adequate information to confidently predict the effect of blanket speed limit reduction is not available. Most previous research has been done on speed limit introduction or on speed differences between vehicles. Information on recent speed traffic volumes, and mobility considerations, it seems clear that speed limits on various classes of roads, such as urban and rural freeways, warrant individual consideration. Benefit cost analysis should be carried out when an estimate of benefits can be made. Cost analysis, including mobility loss, air pollution, etc. could be carried out before benefit information is fully available. Other benefits such as noise reduction should be explored. The higher accident rate on the 401 Toronto Bypass over the rural sections of Highway 401 is held to be

associated with much higher traffic volumes rather than speed. Statistical tables are given for: National Safety Council estimates for U.S. 1973 collisions, U.S. 1961-1973 motor vehicle fatalities by urban and rural areas, and 1974 U.S. motor vehicle fatalities; mileage, fatalities, and collisions on U.S. turnpikes; Ontario collisions and fatalities by highway types; collisions on part of the Toronto Bypass, including month and time of day aspects; Ontario fatal collisions and fatalities on a holiday weekend; and a comparison of 1973 collision data for U.S. and Ontario. Graphs depict percnetages of free flowing vehicles travelling at a given speed on the Toronto Bypass during daylight and darkenss in January 1974.

Ministry of Transport and Communications, Ont., Canada. Safety Res. Section
1974 ; 49p 26refs
Availability: Res. and Devel. Div., Systems Res. and Devel. Branch, Safety Res. Section, Ministry of Transp. and Communications, Ont., Canada

HS-015 925

UNITED STATES LOW POLLUTION POWER SYSTEM DEVELOPMENT TECHNICAL INFORMATION EXCHANGE. A SUMMARY REPORT OF THE ADVANCED AUTOMOTIVE POWER SYSTEMS CONTRACTORS COORDINATION MEETING, JUNE 5,6,7, 1973, ANN ARBOR, MICHIGAN

Presentations and discussions of the Contractors Coordination Meeting are summarized as a means of providing a full accounting of LPPSD progress in the U. S. Chapters are included on: Advanced Automotive Power Systems Program overview; Rankine systems of various corporations; low emission Rankine combustion systems; gas turbine baseline engine program; low emission gas turbine combustion systems; gas turbine technology and problem solving programs; programs and activities related to low emission engines and energy conservation.

Environmental Protection Agency, Advanced Automotive Power Systems Devel. Div., 2929 Plymouth Rd., Ann Arbor, Mich. 48105
Rept. No. LPPSD-1 ; 1973 ; 281p refs
Prepared for the Com. on the Challenges of Modern Society.
Availability: Corporate author

HS-015 926

AUTOMOTIVE POWER SYSTEMS CONTRACTORS COORDINATION MEETING, ANN ARBOR, MICHIGAN, 13-16 MAY 1974. SUMMARY REPORT (7TH)

Conference presentations and discussions of the Alternative Automotive Power Systems (AAPS) are summarized, dealing with key issues under consideration, the Gas Turbine Engine Program, Rankine Cycle Engine Program, diesel engine study, alternative fuel investigations, combustion studies, electric vehicle impact study, and hydrogen storage investigations. Wherever possible, specific data, principle conclusions, and key illustrations are included. Additional supplementary materials contained in the appendices include explanatory notes of the AAPS Division in the EPA organization; a list of attendees; a review of the background and evolution of the new EPA Highway Test Cycle; a final report on the health hazards of nickel oxide regenerator seal materials; and a bibliography of AAPSD reports released through May, 1974.

Environmental Protection Agency, Alternative Automotive Power Systems Div., 2929 Plymouth Rd., Ann Arbor, Mich. 48105
Rept. No. SUMM-7 ; 1974 ; 369p 22refs
Availability: Corporate author

HS-015 927

DEPARTMENT OF TRANSPORTATION SEVENTH ANNUAL REPORT, FISCAL YEAR 1973

The issues facing the Department of Transportation (DOT) in recent years are presented. These reflect changed economic and social conditions, including the energy crisis, railroad crisis, cargo security, etc. Goals and objectives are outlined for the Department. Developments for the fiscal year 1973 are reported with regard to: legislation on aviation, railroads, urban mass transit, water transportation, motor vehicles, gas pipeline safety, and highways; safety and accident prevention; security of commercial transportation; transportation and the environment, including air pollution and noise; DOT action to alleviate the energy crisis; planning and formulation of national transportation policy; efforts to improve social conditions; systems development and technology; aviation development; consumer affairs; highway programs; water transportation and mass transportation programs; international transportation programs; emergency and national defense transportation; and administration of the Department.

Department of Transportation, Washington, D. C.
Rept. No. AR-7 ; 1973 ; 206p
Availability: GPO $2.10

HS-015 928

ANALYSIS OF CAMPUS TRAFFIC PROBLEMS

The necessity of special techniques for safe and efficient movement of pedestrians and bicyclists on university campuses is discussed, along with potential hazards presented by automobile traffic. Guidelines that should be followed when a traffic plan is developed for a campus are described. Data collection techniques and sources of useful existing data are suggested. By examining the collected data and following the recommended guidelines, a comprehensive traffic plan for a campus or similar study area can be developed. These techniques are applied in a specific case study of the University of Colorado to improve traffic flow on the main Boulder campus. Through increased modal separation and establishment of a network of bike routes, modal conflicts are greatly reduced. This is the primary goal that the designers of a campus traffic plan should seek.

by G. Haines; R. Kochevar; V. H. Surti
Publ: TRANSPORTATION RESEARCH RECORD n498 p1-12 (1974)
1974 ; 4refs
Sponsored by the Urban Mass Transp. Administration, and the Com. on Pedestrians. Prepared for presentation at the 53rd Annual Meeting of the Hwy. Res. Board.
Availability: See publication

HS-015 929

MECHANICAL MEASUREMENT OF PEDESTRIAN VOLUMES

A pedestrian flow map developed from manually counted data during 1969 that led to the development of the pedestrian counting device is described. A brief description is given of the counter's development, application, and refinement. The initial studies of pedestrian volumes were made of a downtown employee population, a downtown shopper population, and a mixed population of employees, shoppers, visitors, and residents. The highest daily total at all locations occurred on Friday, and the highest hourly (usually 15% of the weekday total) volume occurred between 12 and 1 p.m. for all three studies. Saturday volumes were small at the employee station and high at the shopper and mixed stations. General and particular pedestrian volume characteristics that would be considered in design of pedestrian facilities are quantitatively described. The tabulated data represent general pedestrian volume trends and can be used for factoring volumes measured during short periods into comparative volumes. Surveys can be designed to measure the most representative sample; sidewalk closure standards can be established by using Fruin's capacity values and known pedestrian volumes in the same manner that lane closures are established from capacity values and traffic counts. Pedestrian volumes can be measured mechanically because daily and weekly pedestrian volumes recurred in regular patterns. Different types of pedestrian populations have different volume patterns, and the studies indicate the effects of weather and shopping days.

by R. M. Cameron
Publ: TRANSPORTATION RESEARCH RECORD n498 p13-9 (1974)
1974 ; 13refs
Sponsored by the Com. on Pedestrians. Prepared for presentation at the 53rd Annual Meeting of the Hwy. Res. Board.
Availability: See publication

HS-015 930

AIR MEDICAL EVACUATION AND SURVEILLANCE SYSTEM

Helicopter and trained paramedic operations in the rural areas of Arizona in 1969 and 1970 are described. They function in a multidimensional role as an airborne force to provide definitive treatment and reduce patient transport time for highway accidents (the evacuation mission) and as a deterrent force to reduce traffic accident potential (the highway surveillance mission). When they were used in patrol and surveillance operations, there was a statistically significant reduction in driver behavior characteristics that are accident related. The helicopter must be evaluated with regard to its total operating capability of performing medical evacuation, patrol and surveillance, and general law enforcement. It cannot be economically justified when used to perform only one type of mission.

by E. M. Wilson; J. S. Matthias
Publ: TRANSPORTATION RESEARCH RECORD n498 p20-8 (1974)
1974 ; 6refs
Sponsored by the Com. on Motorist Services, and the U. S. Dept. of Transp. Prepared for presentation at the 53rd Annual Meeting of the Hwy. Res. Board.
Availability: See publication

HS-015 931

MOTORISTS' ATTITUDES AND BEHAVIOR CONCERNING CALIFORNIA'S ROADSIDE REST AREAS

Results of a research program conducted to assist in evaluating the highway travel and stopping patterns of California drivers are reported. The findings largely deal with long trip motorists, defined as those who have taken at least one trip of 100 miles or more away from home in the previous year (86% of all California motorists). The demographic profile of this motorist closely parallels the profile of California users in general. The median stopping interval for long trip motorists is every 73 miles and 75 minutes; the mean, 81 miles and 85 minutes. The roadside rest area user tends to stop more often than the average long trip motorist. The median stopping interval for all rest area users is every 58 miles and 68 minutes; the mean, 61 miles and 73 minutes. Sixty-four percent of all California highway users have stopped at a roadside rest area at one time or another; long trip motorists are more likely to stop at such an area than short trip motorists. Roadside rest area users have taken considerably more long driving trips (14) than the average California motorist (seven) within the past 12 months. Other findings of the study concern motorists' attitudes and opinions concerning roadside rest areas, reasons for using them, comparison of the rest areas with the ideal stopping opportunity, and related issues.

by J. M. Tyler; C. B. DeVere
Publ: TRANSPORTATION RESEARCH RECORD n498 p29-35 (1974)
1974
Sponsored by the Com. on Motorist Services. Prepared for presentation at the 53rd Annual Meeting of the Hwy. Res. Board.
Availability: See publication

HS-015 932

NONDESTRUCTIVE TESTING. PT. 1: RECENT SURVEY

Three basic methods of nondestructive testing are described: x-ray, holography, and ultrasonics. Procedures of each are detailed and illustrated, along with descriptions of infrared and olfactronic methods. The mention of specific manufacturers and/or methods is for informational purposes and not for endorsement. Defects relating to tire failure are not examined closely, but those defects that the manufacturers have indicated are of a serious nature to them and which appear to be reliably testable by nondestructive testing methods at a reasonable cost are considered. Some pressing problems that need nondestructive testing techniques for finished tires are belt-edge separations in both radial and bias ply belted tires, in-line inspection of the bead and its reinforcement placement.

by P. E. J. Vogel
Publ: RUBBER AGE v106 n11 p33-9 (Nov 1974)
1974
Availability: See publication

HS-015 933

THE CHRISTCHURCH TRAFFIC "BLITZ"

The Christchurch traffic blitz, initiated by the government as one aspect of its policy to reduce traffic accidents on New

Zealand roads, is described. The strategy is discussed and the main results of the Ministry's evaluation summarized. It is noted that there were 21.8% fewer accidents in the metropolitan area during the blitz period by comparison with the same period in the previous year. The blitz strategy included a publicity program utilizing a limited amount of television to supplement press and radio advertising, along with concentrated use of law enforcement officers (one policeman per 2000 population, per 940 motor vehicles, per 6.7 miles of street). Evaluation of the project was conducted in terms of accidents, traffic offenses, road user behavior, public attitudes, advertising, and comparison with a similar program in Hamilton.

Ministry of Transport, Traffic Res. Section, Wellington, New Zealand
Rept. No. Traf-Res-Circ-2 ; 1974 ; 10p
Availability: Traf. Res. Section, Road Transport Div., Ministry of Transport, Private Bag, Wellington, New Zealand

HS-015 934

TRAFFIC SAFETY RESEARCH IN NEW ZEALAND

Background information is provided on the present status of traffic safety research in New Zealand which is applicable in determining the content of the future meetings and research priorities. Organizations that have contributed to the traffic safety research field are cited and their work summarized. They include: National Roads Board; National Council of the Licensed Trade; National Research Advisory Council; Medical Research Council; Department of Scientific and Industrial Research; Health Department; Automobile Association; Christchurch Hospital; universities and private organizations; and the Ministry of Transport.

Ministry of Transport, Traffic Res. Section, Wellington, New Zealand
Rept. No. Traf-Res-Circ-3 ; 1974 ; 7p
Prepared for the Road Traf. Safety Res. Council.
Availability: Traf. Res. Section, Road Transport Div., Ministry of Transport, Private Bag, Wellington, New Zealand

HS-015 935

SUGGESTED TRAFFIC SAFETY RESEARCH PROJECTS

Several subject headings are outlined which could lead to research projects that the Road Traffic Safety Research Council of New Zealand may wish to sponsor. The projects are grouped within the areas of: accident statistics and analysis; human factors; vehicle factors; environmental factors; and medical factors. Within each of these areas projects are arranged in a suggested priority order. Topics within the human factors area are subdivided further; alcohol road safety education; driver evaluation and license testing; vehicle recognition; enforcement; evaluation of publicity; seat belt usage; street lighting; and driver behavior.

Ministry of Transport, Traffic Res. Section, Wellington, New Zealand
Rept. No. Traf-Res-Circ-4 ; 1974 ; 8p 7refs
Prepared for the Road Traf. Safety Res. Council.
Availability: Traf. Res. Section, Road Transport Div., Ministry of Transport, Private Bag, Wellington, New Zealand

HS-015 936

MOTOR VEHICLE DRIVING AND CARDIAC PACEMAKERS

The increasing number of patients with permanent cardiac pacemakers is discussed with regard to their right to be licensed to drive motor vehicles and to the feasibility of issuing them unrestricted driving privileges. The literature is reviewed, information is obtained from cardiologists with experience with large groups of patients with heart disease who use implanted pacemakers, and opinions of physicians experienced in the medical aspects of motor vehicle accidents are included. It is concluded that each patient with a pacemaker who applies for a driving license should be evaluated by an objective, qualified cardiologist. The type of vehicle and type of driving must be considered before determining the applicant's ability to drive safely, and re-evaluation every 6-12 months is suggested. A controlled study of the driving habits and accident rates of people with cardiac pacemakers is advocated.

by H. Brandaleone
Publ: ANNALS OF INTERNAL MEDICINE v81 n4 p548-50 (Oct 1974)
1974 ; 5refs
Reprint.
Availability: See publication

HS-015 937

INCIDENCE OF TRAUMATIC SPINAL CORD LESIONS

The incidence of acute spinal cord lesions was studied in the population of 18 northern California counties for 1970 and 1971. Case ascertainment included the complete review of all hospital admissions as well as the review of all death certificates, autopsy protocols, and the records of the State Departments of Health, Rehabilitation, and Industrial Relations. The average annual incidence rate was 53.4 per million population, and the case fatality rate was 48%. Almost 56% of the spinal cord injuries were attributed to motor vehicle crashes. Incidence rates were three times higher for males than for females. Peak incidence rates were found for males 20 to 24 years old, and females 25 to 29 years of age. The pattern of case fatality rates were not similar for males and females. Age adjusted incidence rates were highest for black males and lowest for males of Asian origin. Risk of spinal cord injury was highest for divorced or separated persons or those who had never been married. The most frequent type of impairment of those hospitalized with a spinal cord injury was quadriparesis. Functional impairment was related to the external cause of spinal cord injury. Any organized program to reduce the incidence of spinal cord injuries must focus on the reduction of motor vehicle crashes and/or the severity of injuries sustained in them.

by J. F. Kraus; C. E. Franti; R. S. Riggins; D. Richards; N. O. Borhani
Univ. of Calif. School of Medicine. Davis, Calif. 95616
1974 ; 30p 14refs
Sponsored by the Insurance Inst. for Hwy. Safety, Washington, D. C. and the Dept. of Community Health, School of Medicine, U.C., Davis. Prepared for presentation at the Annual Meeting of the American Public Health Assoc., New Orleans, La., 23 Oct 1974.
Availability: Dept. of Community Health School of Medicine, Univ. of Calif., Davis, Calif. 95616

HS-015 938

FOOT BRAKE PEDAL FORCE CAPABILITY OF DRIVERS

Distributions of foot force for U. S. drivers were determined in order to derive guidelines for the maximum force requirement for actuation of an automobile service brake. The results of this study are compared with three others conducted at about the same time. Since the fifth percentile female maximum brake pedal force is about 400 newtons, it is recommended that no more than this force be required to attain near maximum braking capability from a passenger car.

by R. G. Mortimer
Publ: ERGONOMICS v17 n4 p509-13 (Jul 1974)
1974 ; 9refs
French and German summaries.
Availability: See publication

HS-015 939

THE EXPOSURE OF YOUNG CHILDREN TO ACCIDENT RISK AS PEDESTRIANS

Pedestrian road accidents showing a marked peak for children aged five to seven years, with boys twice as involved as girls at these ages, are discussed. A survey is described of children's exposure carried out to provide suitable data for qualitative analysis regarding levels of risk. A representative sample of Nottingham school children was interviewed about their trips in the previous 24 hours, and the number of roads crossed and the traffic densities of these roads were recorded. The measures of exposure obtained are presented in relation to the accompaniment of children on their journeys, the type of area in which they live, and time of day. Risk was assessed by relating exposure measures both to the national and local accident statistics. The analysis provides estimates of the risk to children of different ages and sex in their normal pattern of road crossing and in crossing roads of different traffic density and indicates that the accident statistics alone considerably underestimate the degree of risk to children under the age of eight. Interviews with a sample of the parents of the children suggest that children may provide a more accurate measure of their exposure than do their parents.

by D. A. Routledge; R. Repetto-Wright; C. I. Howarth
Publ: ERGONOMICS v17 n4 p457-80 (Jul 1974)
1974 ; 12refs
French and German summaries. Sponsored by the Dept. of the Environment's Transport and Road Res. Lab., Crowthorne, Berks., England.
Availability: See publication

HS-015 940

DIRTY HEADLIGHTS--FREQUENCY AND VISIBILITY EFFECTS

To investigate the problem of dirty headlamps, three experiments were carried out. In the first, dirt layers were systematically collected under various road conditions. The wetness of the road was found markedly to influence the amount of dirt deposited. In the second, light reduction caused by dirt on cars in traffic was measured. It was found that even in dry weather on seemingly clean roads, light reduction due to headlamp dirt is normally 10-20%. In bad or slushy road conditions, few cars have light reductions below 50%. Drivers normally do not react to light reduction below 60%. In the third experiment, reduction in visibility during night driving was measured as a function of light reduction. Light reduction of 60% causes a 20% reduction of high beam visibility and a 15% reduction of low beam visibility.

by K. Rumar
Publ: ERGONOMICS v17 n4 p529-33 (Jul 1974)
1974 ; 3refs
French and German summaries.
Availability: See publication

HS-015 941

RAIL-HIGHWAY GRADE-CROSSING ACCIDENTS FOR THE YEAR ENDED DECEMBER 31, 1971

The thirty-seventh annual statistical report on rail-highway grade crossing accidents is presented, based upon reports of rail carriers filed with the Federal Railroad Administration. Attention is directed toward the hazards inherent at public grade crossings, and toward basic statistical information in support of the overall Dept. of Transportation (DOT) program to promote the safety of both rail and highway traffic at crossings. The 1971 figures show a 4.7% decrease, as compared with 1970, in the number of grade crossing accidents and a 1.8% decline in the number of casualties. The tabular data presented provides valuable material for use in identifying specific trends and conditions surrounding crossing accidents. Statistics are given relating to collisions involving motor vehicles of all kinds: automobiles, buses, motor trucks, and motorcycles.

Federal Railroad Administration, Washington, D. C. 20590
1972 ; 29p
Availability: Corporate author

HS-015 942

RAIL-HIGHWAY GRADE-CROSSING ACCIDENTS FOR THE YEAR ENDED DECEMBER 31, 1972

The thirty-eighth statistical report on rail-highway grade crossing accidents is presented, based upon reports of rail carriers filed with the Federal Railroad Administration. Attention is directed toward the hazards inherent at public grade crossings, and toward basic statistical information in support of the overall Dept. of Transportation (DOT) program to promote the safety of both rail and highway traffic at crossings. The 1972 figures show a slight 0.38% decrease as compared with 1971, in the number of grade crossing accidents and a 3.1% decline in the number of casualties. The tabular information provides valuable material for use in identifying specific trends and conditions surrounding crossing accidents. The data pertain to collisions involving automobiles, buses, motor trucks, and motorcycles.

Federal Railroad Administration, Washington, D. C. 20590
1973 ; 29p
Availability: Corporate author

HS-015 943

RAIL-HIGHWAY GRADE-CROSSING ACCIDENTS FOR THE YEAR ENDED DECEMBER 31, 1973

The thirty-ninth annual statistical report on rail-highway grade crossing accidents is presented, based on reports of rail carriers filed with the Federal Railroad Administration. Attention is directed toward the hazards inherent at public grade crossings, and toward basic statistical information in support of the overall (DOT) Dept. of Transportation program to promote the safety of both rail and highway traffic at crossings. The number of grade crossing accidents in 1973 was the same as in 1972, but there was a 2% decline in the number of casualties. Data in this report does not identify the vast combination of factors leading to such decrease, but the tabular information provides valuable material for use in identifying specific trends and conditions surrounding crossing accidents. The data related to collisions involving automobiles, buses, motor trucks, and motorcycles.

Federal Railroad Administration, Washington, D. C. 20590
1974 ; 20p
Availability: GPO

HS-015 944

FIELD EXPERIENCE OF BREAKAWAY LIGHTING COLUMNS

After summarizing the experimental work done which led to the design of lightweight breakaway lighting columns, a description is given of the five public installations of breakaway columns erected up to the present. The problems encountered in the full scale operation of the installations and the measures taken to solve them are described. Accident records from three of the breakaway installations show that the severity of accidents involving lighting columns is considerably reduced. Most of the accidents with breakaway columns were in the damage-only category and in just less than half of these the damage to the vehicle was so slight that the vehicle could be driven away and was not identified. On the evidence to date, the average cost of a breakaway column accident is less than 20% of the average cost of a conventional column accident. The value of this improvement is likely to exceed considerably the higher capital cost of the columns in the majority of installations for which they are suitable.

by A. E. Walker
Transport and Road Res. Lab., Crowthorne, Berks. (England)
Rept. No. TRRL-LR-660 ; 1974 ; 27p 22refs
Availability: Road User Dynamics Div., Safety Dept., Transport and Road Res. Lab., Crowthorne, Berks., England

HS-015 945

ESTIMATED FEDERAL EXPENDITURES ON DOMESTIC TRANSPORTATION CAPITAL IMPROVEMENT AND OPERATING PROGRAMS BY STATE FOR FISCAL YEARS 1957 - 1971

Estimated Federal transportation program expenditures occurring by year for fiscal years 1957 through 1971 are identified by State and by Standard Metropolitan Statistical Areas (SMSA's) together with areas outside SMSA's (rural areas). The report represents a summary of a detailed back-up report which includes individual State transportation program expenditures tables. The data are organized in modal and general program areas in terms of highways, airways, mass transit, water transportation, and rail transportation. With this report, it is possible to trace the various program expenditure trends on a Federal, State, SMSA and rural area basis as well as make comparisons between these subdivisions. It is believed that this kind of data will be useful to Federal, State, and local transportation planners and policy makers as well as students of transportation and community planning.

Dept. of Transportation, Washington, D. C. 20590
1974 ; 206p refs
Availability: Office of Transportation Planning Analysis, Dept. of Transportation, Washington, D. C. 20590

HS-015 946

MASS TRANSIT TRAINING NEEDS. VOL. 1-- EXECUTIVE SUMMARY

In Volume 1 of a five-volume series, the findings, conclusions, and recommendations of a study of urban mass transit training needs are presented. The results are summarized of an inquiry into industry needs for standardized programs regarding training of bus operators, bus operator instructors, bus mechanics, bus mechanic instructors, and rapid transit rail car repairmen. Following a description of programs currently in use at transit properties, the general contents of the respective standardized programs are outlined, the role of the Federal government in funding is examined, alternative methods of delivering the programs are discussed, and costs of development and demonstration are estimated.

by E. J. Thrasher; P. Wood
Mitre Corp., McLean, Va. 22101
Contract DOT-UT-10005
Rept. No. MTR-6681 ; 1974 ; 41p 18refs
Sponsored by the Urban Mass Transportation Administration in cooperation with the U. S. Dept. of Transportation, and the Joint American Transit Assoc./Inst. for Rapid Transit Com. on Manpower Recruitment, Training and Devel. Vol. 1 of 5. See HS-015 947--HS-015 950.
Availability: NTIS

HS-015 947

MASS TRANSIT TRAINING NEEDS. VOL. 2-- HISTORY AND METHODOLOGY

In part two of a five-volume series covering a study of urban mass transit training needs, the history and methodology of the program are described. Statistics relating to transit industry training are derived, with examples of worksheets for collecting data given. Other volumes deal with the training of bus operators, mechanics, and railcar repairmen.

by E. J. Thrasher; P. Wood
Mitre Corp., McLean, Va. 22101
Contract DOT-UT-10005
Rept. No. MTR-6681 ; 1974 ; 103p 25refs
Sponsored by the Urban Mass Transportation Administration in cooperation with the U. S. Dept. of Transportation, and the Joint American Transit Assoc./Inst. for Rapid Transit Com. on Manpower Recruitment, Training and Devel. Vol. 2 of 5. See HS-015 946, HS-015 948-50.
Availability: NTIS

HS-015 948

MASS TRANSIT TRAINING NEEDS. VOL. 3--BUS OPERATOR TRAINING PROGRAM, BUS OPERATOR INSTRUCTOR TRAINING PROGRAM

The third volume of a five-volume series covering a study of urban mass transit training needs is devoted to bus operators and bus operator instructors. A recommended standardized course for operators is presented, together with sources of suitable training materials. It is considered that existing sources of training are adequate to meet the needs of operator instructors.

by E. J. Thrasher
Mitre Corp., McLean, Va. 22101
Contract DOT-UT-10005
Rept. No. MTR-6681 ; 1974 ; 182p 8refs
Sponsored by the Urban Mass Transportation Administration in cooperation with the U. S. Dept. of Transportation, and the Joint American Transit Assoc./Inst. for Rapid Transit Com. on Manpower Recruitment, Training and Devel. Vol. 3 of 5. See HS-015 946-7, HS-015 949-50.
Availability: NTIS

HS-015 949

MASS TRANSIT TRAINING NEEDS. VOL. 4--BUS MECHANIC TRAINING PROGRAM, BUS MECHANIC INSTRUCTOR TRAINING PROGRAM

The training of mechanics and mechanic instructors is described in this fourth part of a five-volume series covering urban mass transit training needs. An outline of a general training program containing 10 independent modules is presented, together with sources of material for use in the course. Because of the financial difficulties of the mass transit industry, it is recommended that implementation be delayed until funds become available to cover the costs of training.

by E. J. Thrasher; P. Wood
Mitre Corp., McLean, Va. 22101
Contract DOT-UT-10005
Rept. No. MTR-6681 ; 1974 ; 116p
Sponsored by the Urban Mass Transportation Administration in cooperation with the U. S. Dept. of Transportation, and the Joint American Transit Assoc./Inst. for Rapid Transit Com. on Manpower Recruitment, Training and Devel. Vol. 4 of 5. See HS-015 946-8, HS-015 950.
Availability: NTIS

HS-015 950

MASS TRANSIT TRAINING NEEDS. VOL. 5--RAILCAR REPAIRMAN TRAINING NEEDS

The final part of a five-volume series covering urban mass transit training needs is devoted to railcar repairmen. About half of the training is generalized enough to allow a standardized training course to be developed. An outline of such a course, and sources of training material which would be included are presented. Because of the financial difficulties of the mass transit industry, it is recommended that implementation be delayed until funds become available to cover the costs of training.

by P. Wood
Mitre Corp., McLean, Va. 22101
Contract DOT-UT-10005
Rept. No. MTR-6681 ; 1974 ; 52p 10refs
Sponsored by the Urban Mass Transportation Administration in cooperation with the U. S. Dept. of Transportation, and the Joint American Transit Assoc./Inst. for Rapid Transit Com. on Manpower Recruitment, Training and Devel. Vol. 5 of 5. See HS-015 946--HS-015 949.
Availability: NTIS

HS-015 951

SAFETY BELTS AND CHILD RESTRAINTS--THE PROPORTION OF CARS FITTED AND OF OCCUPANTS USING THEM

Surveys of safety belt usage in London and the Thames Valley over the period 1964-1973 are summarized, together with results of an intensive survey in Hounslow in 1970, a survey of the fitting and use of child restraints in six towns in 1974, and a Junior Accident Prevention Council of ROSPA study covering eight regions of Great Britain during 1969 and 1970. The proportion of cars fitted with safety belts to the front seats rose from about 28% in 1967 to 95% in 1973. The percentage of cars observed on motorways with drivers wearing safety belts rose from about 9% in 1964 to 31% in 1970, remained fairly constant up to 1972 and then rose sharply to 49% in 1973. The pattern on "A" class roads was similar. On town roads the percentage rose from 5% in 1964, to 9% in 1968, to 20% in 1973. In Central London the percentage rose from 2% in 1964 to 17% in 1973. The increase in safety belt wearing in the last year coincided with a large national advertising campaign to encourage the use of safety belts sponsored by the Department of the Environment and followed the legal requirement to fit improved seat belts to new vehicles.

by B. N. Farr
Transport and Road Res. Lab., Crowthorne, Berks. (England)
Rept. No. TRRL-LR-644 ; 1974 ; 19p 1ref
Availability: Vehicles Div., Safety Dept., Transport and Road Res. Lab., Crowthorne, Berks., England

HS-015 952

MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION

Conference proceedings on the measurement and prediction of motor vehicle performance are presented. The majors topics include: theory and principles of the mechanics of motor vehicles; vehicle test procedures; vehicle parameters measurements and estimation procedures; and performance simulation by computer methods. Within these subject areas, specific consideration is given to: pneumatic tires; mechanical and kinematic properties of suspensions and steering systems; steady turning behavior; braking systems and braking performance; tire dynamics; directional response to steering; ride and roadholding; limit maneuver response measurement practice; data processing requirements and typical findings; tire measurements and traction findings; measurements and esti-

mates of mass and inertia properties; analog and hybrid approaches to vehicle simulation.

Michigan Univ., Ann Arbor. College of Engineering
Rept. No. UM-7308 ; 1973 ; 640p refs
Engineering Summer Conference, Univ. of Michigan, Ann Arbor, 9-13 Jul 1973. Includes HS-015 953--HS-015 971.
Availability: Corporate author

HS-015 953

THE MOTOR VEHICLE AS A DYNAMIC SYSTEM: TERMINOLOGY AND SYMBOLS

Terminology and symbols that are applied to motor vehicle systems are reviewed. The logic in the symbolic notation used to represent the mechanical and kinematic properties of motor vehicle components and the static and dynamic motions of tire-vehicle systems is identified. The SAE vehicle dynamics terminology is summarized as it pertains to definitions of the forces acting on and the motions exhibited by a vehicle and its components.

by L. Segel
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p9-19
1973 ; 1ref
Availability: In HS-015 952

HS-015 954

THE STEADY-STATE MECHANICS OF PNEUMATIC TIRES

The mechanical performance of a pneumatic tire, in particular the shear force generating ability, is examined. Mention is made of the reliability aspects of the tire structure as an integrated system of physical components. Two coordinate systems necessary for the description of tire mechanical performance are introduced, and kinematic variables, or parameters, are included which indicate tire motion resulting from rolling tire control inputs. Other variables discussed include tire load, tire inflation pressure, tire-road friction potential, path curvature, operating temperature, and steady state shear forces. The equations and graphs are explained in detail.

by J. T. Tielking
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p21-60
1973 ; 5refs
Availability: In HS-015 952

HS-015 955

THE MECHANICAL AND KINEMATIC PROPERTIES OF SUSPENSION AND STEERING SYSTEMS

Some of the properties of steering and suspension systems which are paramount in determining the orientation of the vehicle's wheel are discussed. The passenger car and commercial vehicle are considered separately, with distinction made between properties associated with pitch plane performance and handling performance. The passenger car suspension system is classified as either an independent suspension in which the wheels on the left and right side can move independently of one another, or non-independent suspension in which the motion of one wheel invariably results in some motion on the other side. These are discussed and illustrated in detail, with equations explained. Interaxle load transfer can have a profound effect on the braking performance of commercial vehicles and the load transfer phenomenon is attenuated in proportion to the amount of brake torque which the friction force mechanism is able to react. This in turn manifests itself in axle roll steer or wheel spindle deflection steer.

by C. B. Winkler
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p61-117
1973 ; 3refs
Availability: Bound in HS-015 952

HS-015 956

STEADY TURNING PERFORMANCE

The equilibrium response of a motor vehicle to a fixed value of steering displacement is examined. Concern is specifically with the findings obtained by the application of the principle of statics to the turning vehicle rather than with the analyses themselves. Simple treatments of the linearized single-unit vehicle are given, followed by a review of some of the findings of more thorough analyses of the single-unit vehicle, and a study of the steady-turning behavior of the two-unit articulated vehicle. The concept of the stability derivative (as commonly employed in aeronautics and naval architecture) is introduced without discussion. The objective is to identify the major design features of the motor vehicle that govern its steady response to steering control, with major emphasis given to the results that are obtained from a linear analysis. The behavior exhibited by a motor vehicle during turns made at high values of lateral acceleration as caused by large steer angles or large drive thrusts are also discussed.

by L. Segel
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p119-56
1973 ; 1ref
Availability: In HS-015 952

HS-015 957

BRAKING SYSTEMS AND BRAKING PERFORMANCE

Methods for predicting brake and brake system performance are described. Measures are defined by means of which the various facets of braking performance may be evaluated. This discussion is followed by an analysis of the mechanical friction brake, and equations are derived which allow calculation of the effectiveness of a given brake based upon brake geometry, type of actuation, and lining friction coefficient. The influence of brake fade on effectiveness is also examined, and means of taking thermal considerations into account in effectiveness calculations are given. Procedures for calculating vehicle retarding forces and braking efficiency are given. The

dynamic response of both hydraulic and air brakes is also considered.

by R. W. Murphy
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p157-209
1973 ; 15refs
Availability: In HS-015 952

HS-015 958

THE DYNAMICS OF PNEUMATIC TIRES

The theoretical and experimental evidence related to the nonstationary behavior of the pneumatic tire is reviewed in an examination of tire dynamics. Side-force transients as explained by the "running band" theory are discussed along with side force and aligning moment response to sinusoidal variations of steer angle and lateral velocity. The lag in side force build-up as represented by a point-contact model is also considered. Graphs and equations are explained in detail. Other aspects of tire dynamics briefly evaluated include the influence of time-varying vertical deflections on the lateral mechanical properties of the tire and time varying slip.

by L. Segel
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p211-26
1973 ; 6refs
Availability: In HS-015 952

HS-015 959

DIRECTIONAL RESPONSE TO STEERING

The response produced by steering control is examined, and general discussion is directed at the numerics and/or descriptors that constitute a measure of directional performance. Distinction is made between open-loop measures that describe the performance of the driver-vehicle combination. The overall objective is one of reviewing the turning process in physical terms, both statically and dynamically. It is shown that many directional performance measures do not relate to limit turning and the safety levels and/or driving ease association with these measures are often difficult to assess. The findings that derive from a linear analysis of the tire-vehicle system are reviewed, specifically as they serve as meaningful measures of directional performance. The literature on directional stability and control properties of the motor vehicle is discussed briefly to establish a historical perspective. Graphs and equations are explained.

by P. Fancher
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p227-87
1973 ; 47refs
Availability: In HS-015 952

HS-015 960

RIDE AND ROADHOLDING

Ride response is defined as the vehicle motions resulting from the traversal of a rough road surface. Through the consideration of very simple mathematical representations of the vehicle, it is shown that the sprung mass may be characterized by bouncing and pitching motions, each at a characteristic frequency of about 1 Hz. The tire wheelhop motions are characterized by a bounce motion at about 10 Hz. The tradeoff between ride and roadholding is considered in detail, and it is shown that increased damping may be expected to limit wheel motions but also to produce rough ride for road input in certain frequency ranges. The normal mode method for the analysis of body beam vibration is examined. It is shown that, while the beaming motions may be a quite important component of the total acceleration of the spring mass, a detailed analysis of this motion would require extensive empirical work and detailed computer simulation.

by J. Bernard
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p289-314
1973 ; 5refs
Availability: In HS-015 952

HS-015 961

BRAKING PERFORMANCE MEASUREMENTS

Braking performance test procedures and requirements are discussed, along with methods for evaluating performance of antilock system and driver/vehicle braking efficiency. Basic testing requirements are defined, and effectiveness vs. limit performance is examined. Measurement of vehicle deceleration is illustrated. SAE braking requirements for both passenger cars and commercial vehicles are outlined and shown to result in upgraded performance. The SAE test codes and performance requirements are also related to thermal capacity and performance. Laboratory testing is reviewed. Further consideration is given to lining friction measurements; antilock system performance; driver-vehicle (closed loop) braking performance and efficiency; and pedal force/deceleration gain. Graphs and equations are explained in detail.

by R. W. Murphy
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p315-48
1973 ; 14refs
Availability: In HS-015 952

HS-015 962

DIRECTIONAL RESPONSE MEASUREMENTS AT LOW ACCELERATIONS

A variety of tests and test procedures are discussed which may be used in the measurement of some of the classical numerics describing linear range (less than .3 g lateral acceleration) directional performance of vehicles. Steady-state and then transient performance measures are examined, followed by consideration of instrumentation and calibration requirements. The measures discussed are to be related to linear vehicular theory. Details are given on: constant steering wheel angle method; steering pulse test; free response tests; steering wheel angle velocity; acceleration; angular velocity; vehicle attitude, or pitch and roll; angular displacement transducers;

velocity fifth wheel; accelerators; angular rate and vertical gyros.

by C. B. Winkler
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p349;77
1973 ; 9refs
Availability: In HS-015 952

HS-015 963

LIMIT MANEUVER RESPONSE MEASUREMENT PRACTICE

Specific limit maneuvers are defined, along with combined steering and braking test procedures. The trapezoidal steer maneuver characterizes the limit cornering capability of the vehicle described in terms of maximum path curvature attainable without excessive sideslipping. Sinusoidal steering maneuvers evaluate the vehicle's ability to perform a rapid lane change in response to a symmetric sine wave input of steering displacement. Braking-in-a-turn tests characterize the vehicle's ability to attain large braking levels in a turn without degrading path curvature or displaying excessive side-slip. The drastic steer and brake maneuver imposes the maximum challange to the vehicle's roll stability that can be derived solely from tire/road shear forces and thereby obtain a binary characterization of roll potential under the defined conditions. Measurements of roadholding performance in a turn make possible evaluation of the vehicle's ability to track a curve in the presence of periodic road roughness whose fundamental frequencies in successive tests span the range of wheel hop frequencies. Hardware requirements in open-loop limit maneuver testing are also described.

by R. D. Ervin
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p379-425
1973
Availability: In HS-015 952

HS-015 964

DATA ACQUISITION AND PROCESSING REQUIREMENTS

The use of transducers to measure the dynamic response variables of a vehicle is examined, with emphasis on assessment of the validity of the gathered material. It is noted that specific error problems arise in the use of a gyro-stabilized accelerometer platform, due to a general inability to locate the platform precisely at the total vehicle c.g. Reasonable peak values for each rotational derivative are listed to provide a rough guideline for estimating the magnitude of error during pitch and roll transients. Calibration of rate gyros by the pendulum method is described, which can provide an accurate angular velocity reference by the relationships of simple harmonic motion. Data handling and processing is discussed, along with a description of the HSRI processing system, including flow charts.

by R. D. Ervin
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p427-39
1973
Availability: In HS-015 952

HS-015 965

TYPICAL FINDINGS DERIVING FROM THE APPLICATION OF A SET OF OPEN-LOOP LIMIT MANEUVER TEST PROCEDURES TO CONTEMPORARY PASSENGER VEHICLES

To produce a basis for understanding the limit maneuvering properties of modern passenger vehicles, a study was conducted which involved the application of six limit maneuvers to a 12-vehicle sample. Results gathered during the testing are presented for each test procedure by illustrating the range and distributions of performance numerics with summary plots. These summary plots indicate: an envelope within which all test data is contained; the distribution of all response points for which the 12 contributing vehicles are not identified; and example performances for selected vehicles which demonstrate either a mean or atypical performance. The tests involved straight-line braking, braking-in-a-turn, roadholding in a turn, trapezoidal steer, sinusoidal steer, drastic steer and brake.

by R. D. Ervin
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p441-53
1973
Availability: In HS-015 952

HS-015 966

TIRE FORCE AND MOMENT MEASUREMENTS

Some of the design philosophies and general characteristics of the devices that measure tire forces and moments are discussed, along with their advantages, drawbacks and the applicability, i.e., for comparative or absolute purposes, of the measurements which they provide. Specific examples of each type of device are given. Consideration is given to laboratory measurement devices and on-the-road measuring devices, and the measurement precision is examined. Recommended practices are outlined in order to attain meaningful data in any tire measurement program.

by R. E. Wild
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p455-86
1973 ; 16refs
Availability: In HS-015 952

HS-015 967

TIRE TRACTION FINDINGS

Tire traction findings derived from data collected in the course of several tire research projects are discussed. Two of the projects, the Safety Systems Laboratory Study and the MVMA Tire Traction Research, are directly concerned with the influence of tire design on tire traction performance. Results are examined in terms of construction and wear, and original equipment tire population. The influence of tire construction (i.e., bias, belted-bias, radial) and tire meridian profile as indicated by aspect ratios of the 60-, 70-, and 78-series tires is assessed. Further consideration is given to the influence of the

tire meridian profile, the effect of tire construction on wet traction, and the influence of tread profile on tire traction.

by J. T. Tielking
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p487-512
1973 ; 4refs
Availability: In HS-015 952

HS-015 968

SUSPENSION AND STEERING SYSTEM PARAMETER MEASUREMENTS

The measurement of steering and suspension system parameters which are needed for detailed vehicle dynamics simulations is examined. It is noted that sometimes these parameters represent input-output characteristics of vehicle sub-systems rather than dimensional measurements such as steering or suspension linkage geometry. Passenger car parameter measurement practices and commercial vehicle practices are considered separately. Spring rates; damping characteristics; suspension geometry parameters; suspension compliance parameters; steering system and tire parameters are discussed in relation to passenger cars. Procedures for determination of parameters for trucks, tractors, and trailers are less well defined but measurement techniques for suspension systems and steering systems are considered.

by P. Fancher
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p513-51
1973 ; 7refs
Availability: In HS-015 952

HS-015 969

MEASUREMENTS AND ESTIMATES OF MASS AND INERTIA PROPERTIES

The problem of determining values of the various inertial properties important to the analysis or simulation of vehicle dynamics is considered. Variables examined include: weights of the sprung and unsprung masses; center of gravity position of the sprung and unsprung masses; yaw, pitch and roll inertia of the sprung mass; yaw and roll inertia of the unsprung masses; and spin inertia of the rolling masses. The problem is approached from two angles, outlining both laboratory measurement procedures as well as certain empirical formulas from which reasonable parameter estimates can be made. Some important differences between techniques for passenger car and commercial vehicle measurement are noted.

by C. Winkler
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p553-72
1973 ; 3refs
Availability: In HS-015 952

HS-015 970

ANALOG, HYBRID, AND DIGITAL APPROACHES TO VEHICLE SIMULATION

The state-of-the-art of highway-vehicle dynamics simulation is reviewed to provide background information on the extent and type of work which has been done. The advantages and disadvantages of analog, digital, and hybrid simulation approaches are discussed briefly, and an example analog/hybrid simulation is presented. No discussion of the mechanization of vehicle simulation on a digital computer is given but suggestion of a reference is made for persons interested in a large-scale hybrid simulation of vehicle dynamics to consult.

by P. Fancher
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p573-610
1973 ; 33refs
Availability: In HS-015 952

HS-015 971

THE MECHANIZATION OF VEHICLE SIMULATIONS ON A DIGITAL COMPUTER

The use of digital simulation in studies of vehicle dynamics is discussed with a brief historical background given. The time step method is illustrated, followed by a consideration of the mechanics of the tire-road interface and a review of some methods previously used to deal with the wheel spin problem. Specific consideration is given to the shear forces at the tire-road interface, various modeling techniques, the rotational degree of freedom, and Coulomb friction.

by J. E. Bernard
Publ: HS-015 952, MOTOR VEHICLE PERFORMANCE--MEASUREMENT AND PREDICTION, Univ. of Michigan, 1973 p611-35
1973 ; 9refs
Availability: In HS-015 952

HS-015 972

DESIGNING CHASSIS FOR COMPACT CARS

Current questions of safety and comfort in small vehicles are examined in a discussion of chassis design for compact cars. It is noted that compact car handling requirements create particular problems for the chassis engineer. The designer is forced to observe strict limits of weight, cost, and available space. The prevalence of radial tire usage is cited along with efforts to preserve the riding quality. Consideration is given to computerized suspension design, vibration control and suspension damping, and brake system design. The work of Daimler-Benz is illustrated throughout, and some characteristics of a vehicle with good handling are outlined, including adequate steering response and damping of high yaw velocities.

Publ: AUTOMOTIVE ENGINEERING v82 n12 p23-7 (Dec 1974)
1974
Based on SAE-741039, "Some Aspects of Suspension and Steering Design for Modern Compact Cars," by J. H. Sorsche, K. Enke, and K. Bauer, Daimler-Benz AG, presented at the SAE/DOT International Automobile Tire Conference, Toronto, 22-24 Oct 1974.
Availability: See publication

HS-015 973

DESIGNING DISC BRAKES FOR HEAVY DUTY CONSTRUCTION VEHICLES

The state of wheel-mounted disc brakes are examined, including design, performance, applications, and servicing factors. A design is described which aimed at enhancing servicability by mounting the brake head on a semicircular bolt pattern or adapters so it could be removed without disturbing the planetary gear system. To minimize side loading on actuating pistons, brake linings would be retained in, but not attached to, the brake. Lining retention would be at the ends of the caliper so linings could be removed or replaced by circumferential motion. Typical classes of construction machines are suggested which can utilize the design effectively. Some problems are cited with brake leakage, dust boot life, lining life, disc life, and noise.

by P. A. Smith
Publ: AUTOMOTIVE ENGINEERING v82 n12 p28-33 (Dec 1974)
1974
Availability: See publication

HS-015 974

INTEGRATING ELECTRONICS INTO THE AUTOMOTIVE POWER SUPPLY SYSTEM

The major electrical characteristics of the vehicle power supply system are described, including upper and lower limits and other values which need to be known when incorporating electronics into the total system. The variable operating characteristics are discussed along with problems caused by transient voltages which often occur when the primary power system is connected or disconnected from the vehicle electrical system by the ignition switch. It is suggested that all automotive electronic systems should be protected from polarity reversals, which can occur during manufacture, test, and particularly servicing. A minus 6 v design specification for five min is recommended for electronics connected to primary power system output, and a minus 12 v specification for units connected directly to the battery.

Publ: AUTOMOTIVE ENGINEERING v82 n12 p34-7 (Dec 1974)
1974
Based on "The Automotive Primary Power System," by SAE Electronic Systems Com. Design Information Guides Task Force No. 1, O. W. Bacelis, F. L. Zeisler, R. K. Frank, A. G. Gillund, P. Recupito, W. A. Rogers, and M. H. Oppenheimer, for the International Colloquium on Automotive Electronic Technology, Troy, Mich., 28-30 Oct 1974.
Availability: See publication

HS-015 975

METHANOL-GASOLINE BLENDS: HOW PROMISING ARE THEY?

The feasibility of methanol-gasoline blends, which would stretch limited petroleum supplies, is considered. It is shown that problems exist in increased fuel volatility, vapor locking tendency, poor throttle response, and phase separation. These make t,e blends unsuitable for current motor vehicle engines. Technology for overcoming these problems is examined, and found to be inadequate at the present time.

Publ: AUTOMOTIVE ENGINEERING v82 n12 p38-42 (Dec 1974)
1974
Based on SAE-741008, "Methanol as a Gasoline Extender–Fuel Economy, Emissions, and High Temperature Driveability," by E. E. Wigg and R. S. Lunt, Exxon Res. and Engineering Co., Linden, N. J.
Availability: See publication

HS-015 976

CLASSIFYING RECIPROCATING-ENGINE COMBUSTION SYSTEMS

A classification method is presented which shows the main features of charge formation and combustion events for reciprocating engine combustion systems, both homogeneous and stratified charge. The data are applicable to understanding new approaches to combustion, particularly charge stratification. Specific details are given for homogeneous mixture engines, stratified mixture in air-fuel/air engines, and stratified mixture in air-fuel/products engines. A bibliography is included within the text.

Publ: AUTOMOTIVE ENGINEERING v82 n12 p45-50, 61 (Dec 1974)
1974 ; 39refs
Based on SAE-741156, "Classification of Reciprocating-Engine Combustion Systems," by O. A. Uyehara and P. S. Myers, Wisconsin Univ., E. E. Marsh and G. E. Cheklich, Army Tank Automotive Command, for the SAE International Stratified-Charge Engine Conference, Troy, Mich., 31 Oct-1 Nov 1974.
Availability: See publication

HS-015 977

RATIONALISING TRANSPORT POLICY IN AUSTRALIA

The status of transportation in Australia is examined with questions raised which affect experts in many disciplines. The role of the national Department of Transport as an implementer of government policy and as a provider of inputs to government when it is assessing existing policy and creating new policies is explained. It is noted that the field of road safety is an important element in the approach to reforming the various elements of Australian transport. It is concluded that there are similar needs for information, for uniformity of legislation, and for ensuring that the expenditure of public and private funds is based on a proper undertaking of the total picture supplemented by fully researched and documented evidence in terms of costs and benefits, including social considerations.

by C. C. Halton
Australian Dept. of Transport
1974 ; 15p
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Corporate author

HS-015 978

REQUIREMENTS OF A MASS ACCIDENT DATA SYSTEM

Mass accident data is regarded as a point on an information spectrum in which quantity of data is traded against depth of data in an effort to control cost. The Automotive Crash Injury Research project and its data coverage are described. Consideration is given to the usability of police reported crash data, data classification, vehicle deformation factors, driver and passenger injury, officers' narratives, other data resources, the importance of precise location identification of crashes, motor vehicle inspection, exposure data, and data analysis. The cooperation of police administrators, road officials, and technical personnel is stressed in developing a plan by which data collection laboratory areas can be established, information needs defined, compilation and analysis procedures laid out, and a data system achieved.

by B. J. Campbell
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N. C.
1974 ; 12p
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 979

THE ROLE OF THE AUSTRALIAN BUREAU OF STATISTICS

The current and possible future role of the Australian Bureau of Statistics in the production of road traffic accident statistics is described. The problem of non-uniformity between states in definitions, data items, and processing methods, the difficulties this presents in producing reliable national statistics, and some thoughts about solutions are examined. The Bureau's function as a link between providers and users of statistics is described and emphasis is placed on the importance of close liaison between the Bureau and other organizations concerned with road safety.

by F. D. Bagley
Australian Bureau of Statistics, Rural Construction and Private Finance
Rept. No. Paper-1 ; 1974 ; 24p
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 980

THE ROLE OF ROAD AND TRAFFIC AUTHORITIES IN ACCIDENT STATISTICS

The role of Australian state road and traffic authorities in the collection and use of road accident data is summarized. the extent to which these bodies use a central data bank and the extent to which they collect their own data are also examined. It is shown that while accidents are rarely accidental and each accident normally has several causes, the nature of road accidents is such that they occur in a largely random manner, making the collection of meaningful statistics extremely difficult. Details are given on: the sources of accident data; presentation of data; spot maps; accident rate lists; accident data collection by road authorities; in-depth accident studies; and before and after road improvement studies.

by R. J. S. Thomas
National Assoc. of Australian State Road Authorities
Rept. No. Paper-2 ; 1974 ; 12p 9refs
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 981

UNIFORM DATA COLLECTION

The history of uniform accident reporting in Australia shows that the need for greater uniformity has been realized and fully reported upon over the past 15 or more years. It is suggested that a National Authority must be established to design such a system, but its success will depend on absolute cooperation of state legislatures as well as the good will of the policeman, who is inevitably the collector of the base data. Reports of various national bodies are given, including: the Senate Select Committee on Road Safety Report (1960); Report on Policy and Procedures for the Promotion of Driver Improvement and Road Safety Through Licensing and Enforcement by the Committee on Driver Improvement; the Australian Road Research Board; the National Road Safety Symposium; the Report of the Expert Group on Road Safety; and the House of Representatives Select Committee on Road Safety.

by A. K. Johinke
Road Traffic Board, Walkerville, S.A., Australia
Rept. No. Paper-3 ; 1974 ; 29p 6refs
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 982

POLICE ACCIDENT REPORTING (AUSTRALIA)

The value of current traffic accident reports from which statistical data is gathered, and from which statements are sometimes published giving the causes of accidents, is put into proper perspective. It is suggested that the subsequent data should be treated with caution and should not provide the sole guidelines for remedial measures. An examination was made of the first 500 traffic accidents recorded in Perth, Australia, metropolitan area in 1974. It was found that 34% of the accidents recorded were attended at the scene by police and the remaining 66% were simply reports submitted by the parties involved. Police attend all accidents involving fatalities or serious injuries, but less serious accidents may or may not be so attended. The Police Officer at the scene of the accident is primarily trying to establish if an offence has been committed, but he will also initiate action to remedy any obvious contributing causes found in investigation, especially if he is experienced in this type of work. Reports from accident involved drivers, on the other hand, show apparent limitations in accuracy, particularly in attempting to allot responsibility for the accident. In order for accident investigation to be meaningful and for statistics to have some validity, it is suggested that there be two report forms: one to be used by Police investigating an accident, and the other to be used by the parties involved. Currently, it is believed that the element of truth in accident statistical data is being downgraded by the mixture of

fact and fiction stemming from inaccuracies on the original report.

by R. J. Court
Office of the Aissistant Commissioner of Police, W. A., Australia
Rept. No. Paper-4 ; 1974 ; 13p
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 983

POPULATION CHARACTERISTICS AND MEASURES OF EXPOSURE TO ROAD ACCIDENTS

the availability and quality of information about motor vehicles, drivers, the road system and its usage are discussed, along with the usefulness of this information in assessing the safety of the Australian road system and in deriving measures of population exposure to road accidents. Some applications of exposure characteristics in monitoring road safety are proposed. It is suggested that there is scope for further refinement and application of accident exposure measures, utilizing aggregate data, either available now or a feasible collection task. Statistical tables are given on: mileage of rural and urban roads by type; travel by functional class of road; and comparison of urban road mileage and road travel. Definitions of functional classes of roads are included.

by A. S. Atkins
Commonwealth Bureau of Roads, Melbourne, Vic., Australia
Rept. No. Paper-5 ; 1974 ; 19p 15refs
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 984

SPECIAL PURPOSE MULTI-DISCIPLINE MASS DATA COLLECTION. THE EXPERIENCE OF THE ROYAL AUSTRALASIAN COLLEGE OF SURGEONS' PATTERN OF INJURY SURVEY

The College of Surgeons' Pattern of Injury Survey has shown that mass collection of safety related data on a state-wide scale is feasible. The problems of collection are those of authority, money and personnel to provide organization and supervision. These problems are relatively simple and capable of solution by appropriate action. The outstanding problem to be faced for the future is lack of uniformity, incompatibility of records with computer processing and lack of ready accessibility of information. This problem should be the first major task of any authority which seeks to collect information on a large scale.

by P. G. Nelson
Royal Australasian Coll. of Surgeons, Melbourne, Vic., Australia
Rept. No. Paper-6 ; 1974 ; 22p
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 985

THE PUBLIC USE OF ROAD ACCIDENT STATISTICS

Public accessibility to accident and related statistics in Australia is considered essential because of the dispersed responsibility for managing the road tranpsort system. The technical problems of accessibility are shown to be considerable. It is suggested that certain uses to which statistics are put in the media are open to criticism.

by J. C. Lane
Australian Dept. of Transport, Air Transport Group
Rept. No. Paper-7 ; 1974 ; 11p 5refs
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 986

EVALUATION OF COUNTERMEASURES

Road safety countermeasures and the constraints imposed by lack of suitable data are evaluated. It is held that these limitations may be overcome through careful selection of methods of analysis. The use of control groups and collection of additional information such as exposure data are discussed. An example given to illustrate evaluation techniques is seat belt usage law results in Australia. Problems considered include those of uniformity of data, control groups, and exposure to risk. It is shown that evaluation can only come from the ready availability of appropriately specialized accident information. Injury and fatality rates and statistics before and after the compulsory seat belt usage law are tabulated.

by A. P. Vulcan
Australian Dept. of Transport, Road Transport Branch
Rept. No. Paper-8 ; 1974 ; 27p 16refs
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 987

THE TRI-LEVEL APPROACH TO CRASH INVESTIGATION

The literature on multi-level crash investigation and reporting is reviewed and crash investigation activities in Australia are examined. A method is suggested of utilizing the multi-level concept in the Australian context. The police report is identified as the most readily available source of information on many aspects of car crashes, and a survey of the content of the reports used in each state and the agencies involved in the collection and processing of data is provided. The multi-level investigation system is outlined, with details given from three studies carried out in the United States: Buffalo, New York; Bloomington, Indiana; and Ann Arbor, Michigan. These three studies are nominally similar but show many differences in approach and methodology. An appendix gives the results of a study of the crash experience of semi-trailers. Crash and

injury involvement by type of vehicle for the State of Victoria in 1971 is tabulated.

by G. A. Ryan
Department of Social and Preventive Medicine, Monash Univ. Medical School, Vic., Australia
Rept. No. Paper-9 ; 1974 ; 22p 23refs
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 988

THE USE OF NORTH CAROLINA ACCIDENT RECORDS FOR RESEARCH

Some characteristics of the North Carolina accident records system are described and attempts by the University of North Carolina Highway Safety Research Center to use these data for research purposes are described. Details are given on: accident reporting; goals; resources; problems; bi-level reporting; tire conditions; occupant characteristics; availability, use, and effectiveness of seat and shoulder belts; vehicle safety devices; vehicle factors as revealed by decoding the vehicle identification number; data quality on feedback to police; deformation ratings; and computer coding problems.

by B. J. Campbell
North Carolina Univ., Hwy. Safety Res. Center,
Rept. No. Paper-10 ; 1974 ; 15p 12refs
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 989

THE DEVELOPMENT OF AN IN-DEPTH STUDY OF ACCIDENTS IN METROPOLITAN ADELAIDE

The planning of the proposed in-depth study of accidents in Adelaide, Australia is discussed in terms of the criteria considered important in the development of the study. The general aims of the study are to: study the safety of road users in metropolitan Adelaide; identify factors detrimental to safety; evaluate existing countermeasure effectiveness; and recommend relevant changes to these countermeasures. Areas to be studied include road environment, vehicles, and road users. Data for the study will be collected at the scene of all accidents to which an ambulance is called in the metropolitan Adelaide area. Topics to be investigated, related to roads and traffic are: traffic control devices; traffic control regulations; road layout; road surface; traffic conditions; street lighting; and roadside objects. Vehicle related topics to be investigated are: seat belt usage; side door reinforcement beams; vehicle defects; and vehicle characteristics in accident causation, including motorcycle and pedestrian accidents. Road users will be interviewed to gather information on these topics: driver behavior; attitudes toward safety equipment; driving experience; familiarity with environment; ergonomics; physical impairments; and alcohol involvement. Personnel and equipment to be used in the study are discussed, as well as the techniques of investigation, integration of data with other information, main problems to be overcome, presentation of results, and a time-table of the study.

by A. J. McLean
Road Accident Res. Unit, Adelaide Univ., S. A., Australia
Rept. No. Paper-11 ; 1974 ; 31p 22refs
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974. Sponsored by the Australian Dept. of Transport and the Australian Road Res. Board.
Availability: Australian Dept. of Transport

HS-015 990

THE MOBILE IN-DEPTH ACCIDENT SURVEY IN VICTORIA (AUSTRALIA)

The approach of a in-depth study for the collection of information about injury producing and fatal crashes involving pedestrians and/or car occupants is described. The information is sought to help to produce countermeasures to the road toll. A multidisciplinary team consisting of a medical researcher, an engineer, a sociologist, and an assistant study selected crashes. Samples are being examined from injury or fatal crashes reported to the Victorian Civil Ambulance Service, and from all fatal crashes occurring in the area during the week the ambulance calls are followed. In addition to seeking the answers to numerous crash related questions, general data collection is being conducted. This is classified into three general categories: primary data including identification information on vehicle and driver, police, tow firms, destination of injured people and vehicles, precrash and postcrash movements, injuries treated at the scene, and the time sequence of the crash and its aftermath; secondary data, including medical information from the hospital on injuries and their management, engineering information regarding vehicle damage, injury causes, repair costs, and any pre-existing defects which may have contributed to the crash; and tertiary information, including outcome of injuries, time hospitalized, extent of recovery, and sociological profile of the driver. The techniques of investigation are detailed, resources (personnel, equipment, and finance) shown, and integration of information commented on. The main anticipated problems are choice of what information to acquire and what sort of control groups to use. Presentation of results and timetable for the study are mentioned.

by E. Rubenstein
Consultative Council on Road Accident Mortality, Dept. of Health, Vic., Australia
Rept. No. Paper-12 ; 1974 ; 16p
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Australian Dept. of Transport

HS-015 991

INVESTIGATIONS OF SEAT BELT PERFORMANCE IN NEW SOUTH WALES TRAFFIC CRASHES

Objectives, techniques, and problems of in-depth studies of the performance of adult restraint systems in traffic crashes are discussed. The New South Wales project, Impact-1, is detailed, with briefer descriptions given of Impact-3 and some planning considerations of Impact-2. The broad aim of Impact-1 is to identify those factors which at present limit the effectiveness of seat belt restraint systems. Crashes studied were those in which at least one adult occupant of a 1969 or later model car was fatally injured while wearing a seat belt and the

crash occurred within a 250 mile radius of Sydney, Australia. Consideration is given to crash investigation criteria; data sought and resources available; investigation procedures such as notification, field investigation, and medical data; integration of data with other information; problem areas; and project timetables. Impact-1 is expected to cover a total of about 150 crashes. The broad aim of Impact-3 is to establish the relative benefits of alternative restraint systems for child occupants by establis,ing details of the systems used, damage severities, and child injuries in traffic crashes. Multidisciplinary teams are used for both projects. It is concluded that in a situation where the proportion of passenger vehicle occupants wearing seat belts is high, those who are killed or injured when wearing belts comprise a group of special importance, because, if vehicle occupant casualties are to be further reduced, the reduction must come from this group. Injury data related to seat belt wearing, an accident report form, distribution of delays between fatalities and their investigation, number of fatalities notified per week, a list of equipment used by the Impact-1 field team, and detailed instructions for photographing vehicle damage are included.

by R. G. Vaughan
Traffic Accident Res. Unit, Dept. of Motor Transport, N.S.W., Australia
Rept. No. Paper-13 ; 1974 ; 26p 12refs
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1674.
Availability: Australian Dept. of Transport

HS-015 992

STUDY OF RURAL ACCIDENTS WITHIN 100 MILES OF BRISBANE

The pre-crash and crash phase of accidents, and the vehicle and road contribution to them are examined. Both the controller and social aspects of drivers involved are of interest. Special emphasis is placed on the pre-crash phase of the accidents. Consideration is given to the thinking and strategy behind the study, particularly in terms of the information being sought and the techniques used to obtain it. It is hoped that it will be possible to present the large amount of information which would emanate from the study compactly with the aid of such techniques as numerical taxonomy as well as more traditional statistical techniques. The major problem is identified as the distance and difficulty of reaching the crash scene while people and vehicles involved are still present.

by G. L. McDonald
University of Queensland, Dept. of Mechanical Engineering, Australia
Rept. No. Paper-14 ; 1974 ; 17p
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974. Sponsored by the Australian Dept. of Transport.
Availability: Australian Dept. of Transport

HS-015 993

METHODS OF INVESTIGATING SPARK TIMING AND ITS SCATTER

An investigation of spark timing characteristics was carried out on a 2000 cubic cm Ford Pinto engine mounted in a test cell. Autolite, Lumenition, and Bosch ignition systems have been investigated. Two methods of measurement of spark timing and timing scatter are proposed and evaluated in terms of dynamic and static engine behavior. The relationships between the mechanical and the electrical aspects of ignition are discussed, particularly with regard to contact breaker and optoelectronic firing.

by M. J. Werson; E. M. Stafford; R. W. Todd
University of Southampton, Dept. of Electronics, England
Rept. No. SAE-740314 ; 1974 ; 12p
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.
Availability: SAE

HS-015 994

THE NATIONAL AUTHORITY ON ROAD SAFETY AND STANDARDS

The background developments which led up to the Australian government's decision to establish a National Authority on Road Safety and Standards are described briefly. The functions of the Authority as announced by the Australian Minister for Transport are outlined. Some of the major areas in which future initiatives would be taken are discussed, with emphasis on the need for improved accident information and statistics. In short, the Authority will provide a focus for national efforts towards improving the safety record of the nation's road network. Traffic accident fatalities with fatality rates in Australia in 1960-1973 are given. The Road Safety Research Program for 1973/74 is outlined.

by K. J. Cosgrove
Australian Dept. of Transport
Rept. No. Paper-16 ; 1974 ; 16p
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Corporate author

HS-801 204

CITIZEN PARTICIPATION IN HIGHWAY SAFETY

Direct citizen participation in highway safety programs was examined in terms of a review of the literature, an inventory of existing programs, and consultation with appropriate state, local, and non-governmental authorities, to discuss key issues and to generate innovative ideas for increasing citizen participation. The participation is reported in the following areas: emergency medical services, post-crash response, hazards, youth needs, improving driver behavior, and law enforcement. Important aspects of the citizen participation programs are examined, such as recruitment and motivation, factors facilitating successful programs, safeguards, and evaluation. It is found that citizens may well help to improve the effectiveness of highway safety programs.

National Hwy. Traf. Safety Administration, Washington, D. C. 20590
1974 ; 104p 137refs
A study transmitted by the Secretary of the Department of Transportation to the Congress, in accordance with the requirements of Section 212 of the Highway Safety Act of 1973, Public Law 93-87.
Availability: Office of Driver and Pedestrian Programs, NHTSA, Washington, D. C. 20590

HS-801 209

THE USE OF MASS MEDIA FOR HIGHWAY SAFETY

The use of mass media for informing and educating the public of ways and means for reducing the number and severity of highway accidents is examined. Particular issues addressed include: encouraging the participation and cooperation of television and radio licensees; measuring audience reactions to current educational programs; evaluating the effectiveness of such programs; and developing new programs for the promotion of highway safety. A methodology is defined to apply in media campaigns designed to impact driver behavior, and the study shows the need for a determined national effort that applies this methodology. Attention is directed toward assessment of the mass media campaigns; DOT's national mass media campaign on alcohol and highway safety; mass media in Alcohol Safety Action Projects; and content analysis of 25 major alcohol safety campaigns conducted by corporate, governmental and non-profit organizations.

National Hwy. Traf. Safety Administration, Washington, D. C. 20590
1974 ; 49p 102refs
A study transmitted by the Secretary of the Department of Transportation to the Congress in accordance with the requirements of Section 211(a) of the Highway Safety Act of 1973, Public Law 93-87.
Availability: Office of Driver and Pedestrian Programs, NHTSA, Washington, D. C. 20590

HS-801 255

AN EVALUATION OF THE U. S. FAMILY SEDAN ESV PROJECT. FINAL REPORT

The results of the U.S. Family Sedan Experimental Safety Vehicle Project are evaluated. The topical framework for the evaluation includes: general vehicle design; technology for accident avoidance; technology for crash energy management; technology for post-crash safety; and non-operating safety. It is concluded that, in general, the project approached or met its objectives of post-crash safety concern with fuel system integrity and design for emergency egress/extrication from the occupant compartment under post-crash conditions. Recommendation is that further work along these lines should take the form of cost effectiveness studies.

by G. H. Alexander; R. D. Vergara; J. T. Herridge; W. Millicovsky; M. R. Neale
Battelle Columbus Labs., 505 King Ave., Columbus, Ohio
Contract DOT-HS-322-3-621
Rept. No. DOT-HS-322-3-621-1 ; 1974 ; 386p refs
Report for Feb 1973 - Oct 1974.
Availability: NTIS

HS-801 317

DEVELOPMENT AND EVALUATION OF A STRUCTURAL CRASHWORTHINESS SYSTEM FOR A STANDARD SIZE AUTOMOBILE. FINAL REPORT

A Calspan project is reported which aimed at developing two pre-prototype vehicles which would provide improved structural performance during front, side, rear, and rollover collisions. The project was undertaken at three distinct developmental levels: development and evaluation related to subsystems, the structural system, and two pre-prototype vehicles. Using computational and experimental facilities, various subsystems were investigated, including the frame, passenger compartment structure, door beams, glass and padding. Both static and dynamic component test facilities were used. Review of the results provided a rational basis for integration of individual components into the final system. Complete system evaluation was made with five crash tests performed with important elements of the total system incorporated of the complete systems. Structural modifications were incorporated into two 1973 standard size Ford sedans which represented the pre-prototype vehicles, and which were subjected to handling and crash testing. The crash tests were planned so that front, side, and rear impact data were obtained. The vehicle performance generally met the requirements as stated in the contract. Excellent performance was obtained during lateral collisions, where dummy results were within accepted limits during 30 moving barrier collisions. The total structural modification resulted in a net weight increase slightly less than 10% of the base vehicle (1973 Ford) curb weight.

by P. M. Miller; J. E. Greene
Calspan Corp., 4455 Genesee St., P.O. Box 235, Buffalo, N. Y. 14221
Contract DOT-HS-053-2-487
Rept. No. ZM-5177-V-2-TR ; 1975 ; 288p 31refs
Report for Jun 1972 - Jun 1974.
Availability: NTIS

HS-801 346

URBAN PEDESTRIAN ACCIDENT COUNTERMEASURES EXPERIMENTAL EVALUATION. VOL. 1. BEHAVIORAL EVALUATION STUDIES. FINAL REPORT

A series of site and accident specific pedestrian safety countermeasures had been developed in a previous study, but their effectiveness was not empirically evaluated. This project focused on the determination of the effectiveness of nine safety countermeasures. A series of behavioral studies was conducted to determine the extent to which the proposed countermeasures inhibit undesirable vehicular and pedestrian behaviors. These studies, conducted in eight cities, evaluated the behavioral effects associated with the installation of a countermeasure by means of pairing each experimental site with a control site in a pre-post design. Data collection methods included mechanical recording of vehicle speed and headway, time-lapse photography, and manual coding of pedestrian and vehicle behavior. During the 204 days of data collection, the crossing behavior of over 16,000 pedestrians was characterized. The accident reduction potential of the various countermeasures was assessed. Additionally, the design and implementation problems associated with the countermeasures were discussed.

by W. G. Berger
BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, Va. 22042
Contract DOT-HS-190-2-480
1975 ; 119p 63refs
Report for Jun 1972 - Jan 1974.
Availability: NTIS

HS-801 348

URBAN PEDESTRIAN ACCIDENT COUNTERMEASURES EXPERIMENTAL EVALUATION. VOL. 2. APPENDIX A. REVIEW OF EDUCATION AND PUBLIC INFORMATION MATERIALS. FINAL REPORT

Review of the pedestrian safety activities conducted by state, city and school districts, attempts to reveal the characteristics of ongoing pedestrian safety programs and the extent to which these programs are responsive to the learning needs of the public and the realities of the accident picture. General problems associated with the development of an accident effective pedestrian education program, with guidelines for the design and evaluation of educational/informational programs, are suggested.

by W. G. Berger
BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, Va. 22042
Contract DOT-HS-190-2-480
1975 ; 77p 42refs
Report for Jun 1972 - Jan 1974.
Availability: NTIS

HS-801 350

A COMPARISON OF INJURIES BETWEEN LAP BELTED AND NON-RESTRAINED AUTOMOBILE OCCUPANTS ACCORDING TO SEATED POSITION AND VEHICLE SIZE

Multidisciplinary accident investigation (MDAI) accident reports were examined to determine the effectiveness of lap belts for rear seated occupants. After a clinical study of data on injured occupants, it was found that: unrestrained occupants are more likely to sustain injury than restrained occupants; lap belt injuries are more severe in front seated occupants, while less frequent; and the most vulnerable body areas for severe injuries can be identified. They include thoracic contents, abdominal contents, and head for front seated passengers; abdomen and pelvic girdle for rear seated occupants; and abdominal contents, thoracic contents, major thoracic blood vessels, and head for persons in all positions. Vehicle size is not a factor affecting the severity of injuries to occupants either seated in the front or the rear of the vehicle, and either restrained or unrestrained.

by E. E. Flamboe
National Hwy. Traffic Safety Administration, Washington, D. C.
Rept. No. NHTSA-TR ; 1975 ; 64p 5refs
Availability: NTIS

HS-801 354

HUMAN SUBJECTS FOR BIOMECHANICAL RESEARCH. ANNUAL MEETING (2ND) OF THE INTERNATIONAL AD HOC COMMITTEE. COMMITTEE REPORTS AND TECHNICAL SESSION PAPERS

Minutes of the previous meeting, details of a questionnaire in preparation, ethics, and general guidelines are introduced together with committee reports and technical session papers. Technical papers presented at the session deal primarily with new testing techniques with cadavers, and the meeting was open to a series of informal presentations concerning various biomechanics testing problems, programs and techniques. Subjects reported on included measurement of angular acceleration or a rigid body using linear accelerometers; pressurization of various parts of cadavers; biomedical research concerning human tolerance under traffic conditions, and measurement of body motion in impact.

International Ad Hoc Com. on the Human Subjects for Biomechanical Res.
1974 ; 96p refs
Meeting held at the Hwy. Safety Res. Inst., Ann Arbor, Mich., 6 Dec 1974.
Availability: NTIS

HS-801 379

SCHOOL BUS DRIVER INSTRUCTOR TRAINING INSTITUTE. FINAL REPORT

Key individuals were exposed to the NHTSA-developed curriculum materials for school bus drivers, and teaching methods were explained. Five 30-hr instructor training institutes were conducted in 1974 in various areas of the U.S. at educational institutions. NHTSA identified and referred candidates to attend each institute, and a total of 78 enrollees completed the training program, representing 47 states, Puerto Rico, the Virgin Islands, NHTSA, and the National Safety Council. Ninety-seven percent of the enrollees expect that their organizations will use all or some of the NHTSA curriculum materials in their future training. All institutes proceeded on schedule and ran smoothly, with 92% of the enrollees reporting that the institute was quite valuable or very valuable to them.

by A. M. Cleven; J. T. Fucigna
Dunlap and Associates, Inc., One Parkland Drive, Darien, Conn. 06820
Contract DOT-HS-4-01014
Rept. No. ED-74-16 ; 1975 ; 189p
Availability: NTIS

HS-801 380

ACCELERATION--TIME INTEGRATOR. TECHNICAL REPORT

An electronic unit is described that integrates acceleration forces with respect to time and stores the accumulated value continuously in an electrochemical coulometer cell as a function of electroplated metal. The store value can be remembered indefinitely, and be read out digitally on a metal de-plating unit.

by R. S. Pizer
Tire Systems Division, Safety Res. Lab/RD, National Hwy. Traf. Safety Administration, Washington, D. C. 20590
Rept. No. T-1010 ; 1975 ; 6p
Report for Jun 1974 - Jan 1975.
Availability: NTIS

HS-801 381

PEDESTRIAN LAWS IN THE UNITED STATES

The laws of 50 states and 50 communities selected at random relating to pedestrians are reviewed. The laws and ordinances are those adopted before January 1, 1974, and none adopted

during 1974 are included. The laws are divided into groups dealing with definitions, pedestrian obedience, pedestrians crossing the roadway, other drivers' duties toward pedestrians, other pedestrians' duties, and miscellaneous laws. Specific topics covered include: bicyclists, push carts, toy vehicles, highway construction workers, police traffic directing, traffic control devices, crosswalks, miscellaneous crossing rules, safety zones, sidewalks, walking along the highway, soliciting business, hitchhiking, compliance with bridge and railroad signals, alcoholic pedestrians, and school zones.

by J. W. English; C. W. Conrath; M. L. Gallavan
National Com. on Uniform Traffic Laws and Ordinances
DOT-HS-4-00928
Publ: TRAFFIC LAWS COMMENTARY v3 n3 p1-245 (Oct 1974)
1974 ; refs
Availability: GPO $3.15 Stk No. 5003-00205

HS-801 383

PEDESTRIAN AND BICYCLE SAFETY STUDY. HIGHWAY SAFETY ACT OF 1973 (SEC. 214)

An introduction to and background information on the problem of pedestrian and bicyclist safety is presented, along with an overview of Federal, State, and local activity, the methods employed in the development of the report, and a Congressional recommendation. Separate sections of the report delineate details on pedestrian and bicyclist safety as they relate to: state and local ordinances; enforcement policies, procedures, methods, practices and capabilities of responsible authorities for enforcing rules; the relationship between alcohol and pedestrian and bicycle safety; ways and means of improving programs; an analysis of present funding allocation of safety programs; and an assessment of the capabilities of Federal, State and local governments to fund such activities and programs.

Department of Transp., Washington, D. C. 20590
1975 ; 178p
Availability: GPO

HS-801 387

ADVANCED PASSIVE RESTRAINT SYSTEM FOR SUBCOMPACT SIZE VEHICLE FRONT SEAT PASSENGERS. PROGRESS REPORT NO. 3, 2 SEPTEMBER TO 29 SEPTEMBER 1974

Charts and photographs are offered to illustrate project status on an advanced passive restraint system for subcompact size vehicle front seat passengers. A Pinto mockup was completed, along with the layout for the sled buck, and initial impressions concerning consumer reaction to the presence of the bolster were obtained. Pretest computer simulations were completed and Pinto dash panel strength tests were conducted. The air bag component sub contract award decision was made.

by D. J. Romeo
Calspan Corp., Buffalo, N. Y. 14221
Contract DOT-HS-4-00972
Rept. No. ZM-5566-V ; 1974 ; 32p
Availability: NTIS

HS-801 388

ADVANCED PASSIVE RESTRAINT SYSTEM FOR SUBCOMPACT SIZE VEHICLE FRONT SEAT PASSENGERS. PROGRESS REPORT NO. 1, 28 JUNE TO 28 JULY 1974

Charts and photographs are offered to illustrate the status of work on an advanced passive restraint system for subcompact size vehicle front seat passengers. Accomplishments include submission of the program plan, purchase of a 1974 Pinto, installation of a cardboard tape mockup of bolster and knee bar in the Pinto, with acquisition of initial consumer feedback, and initial NHTSA briefing. Fund expenditures, work plans, and interim results are reported.

by D. J. Romeo
Calspan Corp., Buffalo, N. Y. 14221
Contract DOT-HS-4-00972
Rept. No. ZM-5566-V ; 1974 ; 13p
Availability: NTIS

HS-801 389

ADVANCED PASSIVE RESTRAINT SYSTEM FOR SUBCOMPACT SIZE VEHICLE FRONT SEAT PASSENGERS. PROGRESS REPORT NO. 2, 29 JULY TO 1 SEPTEMBER 1974

Data and charts are presented to explain the status of an advanced passive restraint system for subcompact size vehicle front seat passengers. Fabrication and installation of an aluminum bolster and knee bar were completed. A planned consumer acceptance study was not worked on in this reporting period. Input data for the simulations were assembled, and a 50th percentile, 50 mph frontal crash simulation was obtained. Project expenditures are reviewed briefly, and work plans are outlined.

by D. J. Romeo
Calspan Corp., Buffalo, N. Y. 14221
Contract DOT-HS-4-00972
Rept. No. ZM-5566-V ; 1974 ; 15p
Availability: NTIS

HS-801 390

OCCUPANT SURVIVABILITY IN LATERAL COLLISIONS. PROGRESS REPORT NO. 2, 1 SEPTEMBER TO 30 SEPTEMBER 1974

The feasiblity is examined of modifications to the vehicle interior and glazing which, when combined with structural modifications to upgrade compartment integrity, will allow occupants to survive severe lateral collision accidents in a completely passive manner. Investigation of possible side glazing materials was continued with emphasis on ascertaining what type of laminates represent feasible alternatives to monolithic thermal-tempered glass, and what types of laminates can be procured for project use. A headform drop impactor representing a six (6) year old child was designed to be made for use in impact testing of glazing materials. Fabrication of the five (5) automobiles to be used in testing was begun

and stripping of their interiors completed. A time and cost schedule chart is included.

by J. E. Greene
Calspan Corp., Buffalo, N. Y. 14221
Contract DOT-HS-4-00922
Rept. No. ZS-5562-V ; 1974 ; 5p
Availability: NTIS

HS-801 391

OCCUPANT SURVIVABILITY IN LATERAL COLLISIONS. PROGRESS REPORT NO. 1., 1 JULY TO 31 AUGUST 1974

The feasibility is studied of modifications to the vehicle interior and glazing which, when combined with structural modifications to upgrade compartment integrity, will allow occupants to survive severe lateral collision accidents in a completely passive manner. Base line lateral collision tests are reviewed briefly. More details are given on the investigation of advanced interior padding and glazing materials and configurations, and on the fabrication of vehicles incorporating modified structures and interiors. Expenses to date and work plans are outlined.

by J. E. Greene
Calspan Corp., Buffalo, N. Y. 14221
Contract DOT-HS-4-00922
Rept. No. ZM-5562-V ; 1974 ; 6p
Availability: NTIS

HS-801 392

PRODUCTION FEASIBILITY--CRASHWORTHINESS STRUCTURE FULL SIZE CARS (PHASE 1). PROGRESS REPORT NO. 20, 1 FEBRUARY TO 28 FEBRUARY 1974

As part of a study of the production feasibility of a crashworthy structure for full size cars, one objective was to produce two near prototype full size vehicles which incorporate front, side, and rear structural modifications. Effort during this report period was concentrated on the final assembly stages of the pre-prototype vehicles, which are described in some detail. No problem areas were encountered. Work items for the next reporting period are outlined.

by J. M. Horowitz
Calspan Corp., Buffalo, N. Y. 14221
Contract DOT-HS-053-2-487
Rept. No. ZM-5177-V ; 1974 ; 4p
Availability: NTIS

HS-801 393

INFLATABLE BELT DEVELOPMENT FOR SUBCOMPACT CAR PASSENGERS. PROGRESS REPORT, AUGUST 1974

The month's activities related to the development of an inflatable belt for subcompact car passengers are reported. Computer program modifications to the AIRBLT computer program and test case runs to check out the program are described. The computer simulations with the AIRBLT program for 50 mph frontal barrier impact were begun to ascertain the anchor point locations and force limiter properties that best satisfy the injury criteria for the anthropomorphic size range. Bid receipts and evaluations for the airbelt inflator are mentioned, as well as the selection of material to fabricate the airbelt. Preliminary design of the system is discussed. Graphs and diagrams are included in illustration.

by M. Fitzpatrick
Minicars, Inc., La Patera Lane, Goleta, Calif. 93017
Contract DOT-HS-4-00917
1974 ; 45p
Availability: NTIS

HS-801 394

INJURY ASSESSMENT OF BELTED CADAVERS. PROGRESS REPORT NOS. 2 THROUGH 12, AUGUST 1973 THROUGH JUNE 1974

Each progress report details the accomplishments during the reporting period, the work planned for the next reporting period, funds committed, preliminary results, problems or delays, and recommended NHTSA action. Mathematical representations, graphs, tabular data, and photographs are included to illustrate the findings and progress. Data reported deal with collision simulation, acceleration tolerance, impact testing, reports of autopsies performed on the cadavers after the experiments, work schedules, and budget expenditures.

by L. M. Patrick; A. I. King
Wayne State Univ., Biomechanics Res. Center, 5050 Anthony Wayne Dr., Detroit, Mich. 48202
Contract DOT-HS-146-3-753
Rept. No. PR-2; PR-3; PR-4; PR-5; PR-6; PR-7; PR-8; PR-9; PR-10; PR-11; PR-12
Availability: Reference copy only

HS-801 395

ASSESSMENT OF BELTED CADAVERS. PROGRESS REPORT NOS. 1 AND 2, JUNE 30, 1974 THROUGH AUGUST 31, 1974

The program status of an injury assessment of belted cadavers is briefly reviewed. Accomplishments during the period are detailed, and deal with: procurement of cadavers, a chest deflection transducer, Impala and Vega production seats; modifications to the test fixture; and hiring of an anatomist as program consultant. Future plans and funds committed to date are outlined.

by J. R. Cromack
Southwest Res. Inst., Vehicle Safety Section, 8500 Culebra Rd., P.O. Drawer 28510, San Antonio, Tex. 78284
Contract DOT-HS-4-00998
Rept. No. PR-1; r-2 ; 1974 ; 4p
Availability: Reference copy only

HS-801 396

INFLATABLE OCCUPANT RESTRAINT SYSTEM. MONTHLY PROGRESS REPORT NO. 12, JULY 1974

Progress in the development of an inflatable occupant restraint system is reported which can protect right front seat passengers of automobiles in 50 mph frontal impacts, but which is not so violent an inflation as to injure an occupant who may be situated in the path of the deployed inflatable. Work ac-

complished during the reporting period is detailed, including efforts on the computer model to upgrade it to be able to predict different crash pulse performance and performance at other ambient temperature conditions. The preliminary pieces of rake section were assembled into the versatile hardware and a test run in the double tank facility to determine the changes in performance that could be expected from the high production fabrication techniques. Graphs and diagrams are given in illustration.

by L. B. Katter
Rocket Res. Corp., York Center, Redmond, Wash. 98052
Contract DOT-HS-344-3-690
1974 ; 22p
Financial data period covered 29 Jun-2 Aug 1974.
Availability: Reference copy only

HS-801 397

INFLATABLE OCCUPANT RESTRAINT SYSTEM. MONTHLY PROGRESS REPORT NO. 13, AUGUST 1974

Current status is described of a program to develop an inflatable occupant restraint system which can protect right front seat passengers of automobiles in 50 mph frontal impacts, but which is not so violent an inflation as to injure an occupant who may be situated in the path of the deployed inflatable. Work accomplished during this reporting period focused on upgrading of the computer model, with static and dynamic testing of the production prototype system. Bids were requested for the barrier testing phase. Graphs and data summaries are included, and schedules and work plans are outlined.

by L. B. Katter
Rocket Res. Corp., Redmond, Wash.
Contract DOT-HS-344-3-690
1974 ; 57p
Financial data period covered 3-30 Aug 1974.
Availability: Reference copy only

HS-801 402

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 15. POLICE TRAFFIC SERVICES

Police traffic services are reviewed in one volume of an 18-volume series meant to assist state and local agencies in implementing their highway safety programs. The Police Traffic Services Program aims at reducing the number of traffic collisions and minimizing the adverse consequences of collisions through improvement of police traffic services. Details are given on authority, general policy, program development and operations, program evaluation, reports, local government participation, and funding criteria. Appendices deal with the Highway Safety Program Standard 15, a glossary of definitions, references, representative projects, and resource organizations.

National Hwy. Traffic Safety Administration, Washington, D. C.
1974 ; 61p 11refs
Updated version of HS-820 049. Vol. 0 is HS-820 036; vols. 1-2 are HS-801 461--HS-801 462; vol. 3 is HS-820 039; vols. 4-6 are HS-801 463--HS-801 465; vol. 7 is HS-801 349; vol. 8 is HS-820 044; vol. 9 is HS-801 466; vol. 10 is HS-820 046; vols. 11-14 are HS-801 467--HS-801 470; vol. 16 is HS-820 050; vol. 17 is HS-801 329; vol. 18 is HS-801 471.
Availability: GPO $1.60

HS-801 403

TRANSMISSION SYSTEMS ANALYSIS. FINAL REPORT

The need was examined for standardizing the shift patterns c manual transmissions in passenger vehicles and for developin recommendations for an optimum pattern. Problems that truc drivers experience in shifting gears in both trucks and car were identified and their opinions solicited with regard to th need for a standard in trucks. A survey of automobile manu facturers and distributors indicated that the proportion of cars sold in the U.S. with manual transmissions, decreased fron 1971 to 1973 but increased during the first half of 1974. Ar analysis of errors, made while shifting gears in driving situations, provided evidence that driving vehicles with different unfamiliar shift patterns can be hazardous and may lead tc serious accidents. Further analysis indicated that shifting errors can be significantly reduced by standardizing on a single pattern for all manual transmissions and by using a reverse lockout. Specific shift patterns and reverse lockout were recommended as the standard in automobiles. A survey of 200 truck drivers indicated that they make errors in shifting gears few of which result in accidents and that most errors occur when driving trucks with unfamiliar shift patterns. The majority of drivers expressed a desire for a standard shift pattern in all trucks.

by L. L. Vallerie; D. T. Kunkel
Dunlap and Associates, Inc., One Parkland Dr., Darien, Conn. 06820
Contract DOT-HS-4-00977
1974 ; 338p 14refs
Availability: NTIS

HS-801 404

BICYCLING LAWS IN THE UNITED STATES

The laws of 50 states and 50 communities selected at random relating to bicycles are reviewed. The laws and ordinances are those adopted before January 1, 1974, and are divided into several major groupings: legal status of bicycles; accident requirements and rules of the road; special rules for the operation of bicycles; bicycle registration; dealer regulation; special procedures and penalties; enabling legislation; and miscellaneous bicycle laws. Specific laws cited deal with: definitions; signs, signals, and markings; turning maneuvers; position on roadway; speed; rules for riding on the roadway, bicycle lanes and paths, and sidewalks; rules for parking; equipment requirements; municipal ordinances; impoundment; violations by children; safety education; licensing; and insurance.

by J. W. English; C. W. Conrath; M. L. Gallavan
National Com. on Uniform Traffic Laws and Ordinances
Contract DOT-HS-4-00928
Publ: TRAFFIC LAWS COMMENTARY v3 n2 p1-207 (Sep 1974)
1974 ; refs
Availability: GPO $2.80

HS-801 410

SYMPOSIUM ON DRIVING EXPOSURE. FINAL REPORT

Summaries of the sessions of the Symposium on Driving Exposure are presented, including current status in the field of

driving exposure, problem areas in driving exposure research, problem areas in obtaining exposure data, and future plans for exposure research and data collection. Conclusions include a consensus that a national exposure program should be established; that further research is needed on exposure measures and classifications, data collection and sampling plans, and induced exposure; and that states should be involved in the national program. The basic recommendation is that NHTSA should begin planning for a national exposure-data collection and research program, to be fully operational in 1977.

by P. S. Carroll
Hwy. Safety Res. Inst., Univ. of Michigan, Ann Arbor, Mich. 48104
Contract DOT-HS-031-3-637
Rept. No. UM-HSRI-SA-73-7 ; 1975 ; 33p
Report for May 1973 - Aug 1973. Symposium held in Silver Spring, Md., 18-20 Jun 1973.
Availability: NTIS

HS-801 414

A COMPARATIVE EVALUATION OF STRUCTURED AND FREE TEXT SEARCHING OF THE NHTSA DATA BASE. FINAL REPORT

A comparative evaluation of two computerized retrieval systems is given. The two systems operate on the same document collection, but one uses conventional thesaurus search terms for indexing and access to the collection in a batch mode, while the other is an interactive system that provides a direct access to document abstracts through free text word and phrase matching. The evaluation is empirical, based on comparing the relevance of retrieved abstracts to a set of user queries, and scoring the output according to a retrieval effectiveness measure. The results show that there is no significant difference between the retrieval effectiveness of the two systems. Secondary evaluation criteria dealing with human factors and systems aspects are also discussed. The analysis shows that the interactive system has considerable advantages over the batch mode system, especially in regard to user human factors.

Operating Systems, Inc., 18345 Ventura Blvd., Tarzana, Calif. 91356
Contract DOT-HS-251-2-444-IA; Ref: NAS-7-100
Rept. No. OSI-P-74-143 ; 1975 ; 81p 7refs
Prepared for the Jet Propulsion Lab., Calif. Inst. of Tech., under Interagency agreement between National Hwy. Traf. Safety Admininstration and the National Aeronautics and Space Administration.
Availability: NTIS

HS-801 417

A STRATEGIC STUDY FOR COMMUNICATION PROGRAMS ON ALCOHOL AND HIGHWAY SAFETY. HIGH SCHOOL STUDY. A PRELIMINARY REPORT

A representative sample of high school students is analyzed to provide NHTSA with strategic direction for communications programs aimed at this group regarding alcohol usage and highway safety. Details are given on the development of the measurement tool, and the alcohol related situation (ARS)-involved high school student, including size and nature of the situation, alcohol attitudes, drinking behavior, and driving behavior. Demographic, scholastic, social, and personality characteristics are tabulated. Potential countermeasures are reviewed.

Grey Marketing and Res. Dept.
Rept. No. GMRD-10300BR606 ; 1974 ; 75p
Prepared for the Office of Pedestrian and Driver Programs, National Hwy. Traf. Safety Administration, U. S. Dept. of Transp.
Availability: Reference copy only

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City of Lakewood, Colo.
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Commonwealth Bureau of Roads, Melbourne, Vic., Australia
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HS-015 983

Consultative Council on Road Accident Mortality, Dept. of Health, Vic., Australia
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De Leuw, Cather and Co., 1256 Market St., San Francisco, Calif.
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Department of Social and Preventive Medicine, Monash Univ. Medical School, Vic., Australia
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Department of Transp., Washington, D. C. 20590
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Empirical Society, 851 N. 26th St., Lincoln, Nebr. 68503
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Environmental Protection Agency, Alternative Automotive Power Systems Div., 2929 Plymouth Rd., Ann Arbor, Mich. 48105
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Road Traffic Board, Walkerville, S.A., Australia
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Rocket Res. Corp., York Center, Redmond, Wash. 98052
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Royal Australasian Coll. of Surgeons, Melbourne, Vic., Australia
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Wayne State Univ., Biomechanics Res. Center, 5050 Anthony Wayne Dr., Detroit, Mich. 48202
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DOT-HS-031-3-637
Hwy. Safety Res. Inst., Univ. of Michigan, Ann Arbor, Mich. 48104
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Calspan Corp., Buffalo, N. Y. 14221
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Calspan Corp., 4455 Genesee St., P.O. Box 235, Buffalo, N. Y. 14221
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DOT-HS-146-3-753
Wayne State Univ., Biomechanics Res. Center, 5050 Anthony Wayne Dr., Detroit, Mich. 48202
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BioTechnology, Inc., Falls Church, Va.
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BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, Va. 22042
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Southwest Res. Inst., Vehicle Safety Section, 8500 Culebra Rd., P.O. Drawer 28510, San Antonio, Tex. 78284
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BioTechnology, Inc., Falls Church, Va.
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CONTRACTS AWARDED

DOT-HS-5-01120 Delivery Order 1

COMPLIANCE TESTING OF DOOR LOCKS AND DOOR RETENTION COMPONENTS - PASSENGER CARS, MULTIPURPOSE PASSENGER VEHICLES, AND TRUCKS

Ten (10) tests of FMVSS No. 206 will be conducted in accordance with NHTSA Laboratory Test Procedures TP-206-02 dated November 1973.

Detroit Testing Laboratory, Inc., 8720 Northend Ave., Oak Park, Mich. 48237
No change
$3,200.00

DOT-HS-4-00871 Mod. 5

OPERATION AND MAINTENANCE OF THE COMBINED OSE PERIODIC REPORTS SYSTEM AND TIRE TEST DATA MANAGEMENT SYSTEM

Four (4) special data studies are added to the original contract increasing the total to forty (40). A Datapoint 2200 terminal will be leased for use. 0gic

Control Systems Research, Inc., 1515 Wilson Boulevard, Arlington, Va. 22209
Extended to 15 Mar 76
Increased $77,829.00

DOT-HS-4-00897 Mod. 2

IMPACT OF RECENT CHANGE IN HIGHWAY SAFETY ENVIRONMENT

University of North Carolina, Highway Safety Research Center, Chapel Hill, N.C. 27514
No change
Increased $94,200.00 9

DOT-HS-4-00923 Mod. 2

TIRE PARAMETER DETERMINATION

A group of tires which have seen nationwide passenger car service will be used in investigation of the accuracy requirement and achievement of tire rolling resistance measurements in laboratory tests at the Tire Research Facility (TIRF). Under a simple and economical method of measuring rolling resistance of such tires, the variables for speed, inflation, torque, load, tire deflection, tread characteristics and size will be made.

Calspan Corporation, 4455 Genesee Street, Buffalo, N.Y. 14221
To be completed nine (9) months after commencement date of project
Increased $50,000.00

DOT-HS-4-00959 Mod. 1

INSTRUCTOR-TRAINING INSTITUTE FOR NHTSA CURRICULUM PACKAGE: DETECTION AND APPREHENSION OF DWI DRIVER

Fifty (50) sets of audio visual materials are to be acquired for use in the Instructor Institute on Detection and Apprehension of DWI Driver.

Dunlap and Associates, Inc., One Parkland Drive, Darien, Conn. 06820
Extended to 30 Jun 75
Increased $13,331.00

DOT-HS-5-01063 Task Order 1

KEYING AND VERIFICATION FOR THE FINANCIAL MANAGEMENT INFORMATION AND ACCOUNTING SYSTEM

Opportunity Systems, Inc., 1330 Massachusetts Ave., N.W., Washington, D.C. 20005
To be completed 1 Jan 76
$19,160.00

DOT-HS-5-01063 Task Order 2

CODING AND EDITING OF FINANCIAL MANAGEMENT INFORMATION AND ACCOUNTING SYSTEMS (FMIAS) DATA

Opportunity Systems, Inc., 1330 Massachusetts Ave., N.W., Washington, D.C. 20005
To be completed 31 Mar 75
$8,130.00

DOT-HS-5-01063 Task Order 3

CODING AND EDITING SUPPORT FOR THE NATIONAL DRIVER REGISTER

Opportunity Systems, Inc., 1330 Massachusetts Ave., N.W., Washington, D.C. 20005
To be completed one (1) year from date of the task order
$30,720.00 0y (

DOT-HS-5-01063 Task Order 4

ON-ROAD VEHICLE FAILURE STUDY

Objective of a cooperative effort of the National Highway Traffic Safety Administration (NHTSA), the American Automobile Association, and the Virginia Department of

Highways, Safety Service Patrol, is to identify the types, modes, and levels of vehicle-in-use system, subsystem, and component failures as a function of make, model, model year, mileage, age and usage factors. A major product of this study is the On-Road Vehicle Failure Questionnaire which is distributed to stranded or disabled motorists during the course of the normal business of the two above named organizations. The driver of the disabled vehicle or his mechanic will indicate on the questionnaire the cause of the particular disablement as well as other pertinent vehicle data. The questionnaires will be voluntarily returned to NHTSA for data processing and analysis. Contractor will modify the codebook and the data coding procedures from the Vehicle Disablement Study - Pilot Program in accordance with the questionnaire data, updating vehicle description and model year codes or creating component categories and codes or fault descriptions as necessary.

Opportunity Systems, Inc., 1330 Massachusetts Ave., N.W., Washington, D.C. 20005
To be completed 10 Sep 75
$11,927.00

DOT-HS-5-01078

THE DEVELOPMENT OF A MOVING NONRIGID CRASH TEST BARRIER TO ASSESS VEHICLE AGGRESSIVENESS AND CRASH SURVIVABILITY

Aggressiveness poses hazards which appear to result from three vehicle characteristics. Architectural aggressiveness results when one vehicle generates a concentrated load against a soft part of the structure of the other vehicle. Mass aggressiveness would be typified by a vehicle with a heavy engine located very close to the front of an automobile such that in a collision against the side of another vehicle, the engine, by virtue of its mass alone and independent of its structural attachment to any other part of the vehicle, produces lethal penetration of the door of the struck vehicle. Structural aggressiveness refers to the force balance between the two collapsing vehicle structures in a car-to-car crash whereby a very stiff vehicle structure will force the softer vehicle to absorb most of the crash energy that must be dissipated. In any given car-to-car crash, all three types of aggressiveness work together in a complex way. It is the objective of this program to develop a test barrier with appropriate sensitivity to the three basic types of aggressiveness to provide a tool for the measurement and assessment of the overall aggressiveness of a vehicle structure. A moving nonrigid crash test barrier with the capability of assessing vehicle aggressiveness and crash survivability is to be designed, fabricated and tested.

Department of Transportation, Federal Aviation Agency, Atlantic City, N.J. 08405
To be completed 10 Aug 75
$90,388.44

DOT-HS-5-01092

IMPLEMENTATION AND OPERATION OF FATALITY ACCIDENT FILE

Effort will be made to establish a statistical file which will contain the data needed to produce periodic reports describing the accident environment, to track the various accident countermeasure programs and to provide data for States to evaluate their problems and programs with respect to the regional and national data. Data will be collected manually from official enforcement officers' traffic accident reports, driver history records, death certificates, coroners' reports, hospital records and health department records. Manually coded case records of fatal motor vehicle traffic accidents will be submitted on a monthly basis.

State of Connecticut, Department of Motor Vehicles, 60 State St., Wethersfield, Conn. 06109
To be completed 31 Dec 75
$20,071.55

DOT-HS-5-01093

NATIONAL DRIVER REGISTER SYSTEM DESIGN

Contractor shall design an improved National Driver Register (NDR) data processing and communications system which will provide the level of service required by the States. After a thorough review of previous studies made of the NDR and the current NDR system, the contractor will prepare and submit a plan of work and methodology. The plan shall describe the type of data to be obtained from the States, which States will be contacted, and on what time schedule. It shall present the method of analysing this data to arrive at the systems definition and subsequent system design. A rationale for supporting the features of the system definition in the value framework of the States and the Federal Government will be included.

Rockwell International Corporation, 1701 No. Fort Meyer Dr., Suite 1104, Arlington, Va. 22209
To be completed 25 Mar 76
$166,230.00

DOT-HS-5-01096 IA

AUTOMATIC BRAKING SYSTEMS

Objectives of this research are to investigate and determine radar braking subsystem design techniques to insure satisfactory system operation and performance in the presence of blinding, varying highway geometry, false alarms, and other adverse scenarios where proper detection and identification of targets may be affected; to evaluate the design, performance, and technical feasibility of the Sperry Rand Research Center's "baseband" radar device as a potential detection sensor for a vehicular radar braking system; and to monitor, evaluate and participate with the radar braking systems analysis contractor to resolve and clarify the technical system requirement and feasibility resulting from optimized system configurations designed to maximize the accident prevention capability. Areas to be evaluated and discussed shall include, in part, on-road target detection capability; adjustable beam width; accuracy; repeatibility; and susceptibility to and source of interference. Monthly progress reports will be submitted. ier

Department of Commerce, Institute for Telecommunications Sciences, 325 Broadway, Boulder, Colo. 80302
To be completed eight (8) months from date of contract award
$25,000.00

DOT-HS-5-01097

AUTOMOTIVE EMI RESEARCH

Work on Department of Transportation sponsored "Investigation of Electromagnetic Interference (EMI) Effects on Motor Vehicle Control and Safety Devices" is being done

in two phases. Phase I, currently in progress under Contract DOT-HSr4-00918, will define the potential problem of EMI from all sources that may cause malfunction of motor vehicle electronic control and electronically actuated safety control devices. Phase II should include a compilation and refinement of the Phase I general design guidelines to circumvent those potential and real interference problems previously identified and verified. The specifics of installation and packaging guidelines will evolve from the verification tests of the Phase I models and documentation. The guideline document for Phase II will look to the on-going research and study efforts of the automotive and electronic industries to be abreast of the latest circuit component designs, particularly those that address the severe environment of the motor vehicle.

Department of Commerce, Institute for Telecommunication Sciences, 325 Broadway, Boulder, Colo. 80302
To be completed 1 Jul 76
$140,000.00

DOT-HS-5-01102

ANALYSIS OF RECENT ACCIDENT EXPERIENCE

A computer program is to be developed providing a statement of problem formulation for the Office of Statistics and Analysis. Following familiarization of the National Highway Traffic Safety Administration (NHTSA) files the contractor will recommend a data processing procedure, perform exploratory analysis of the Special Adjudication for Enforcement (SAFE) Accident files, develop the necessary computer programs and provide formal documentation of these programs. ne

Washington Data Processing, Inc., Calvert Building, Suite 606, 6811 Kenilworth Ave., Riverdale, Md. 20840 "This contract is awarded by the Small Business Administration under the authority of Section 8(a) of the Small Business Act (USC 637a) and will be administered by the Department of National Highway Traffic Safety Administration."
To be completed six (6) months from date of contract award
$15,000.00

DOT-HS-5-01103 Delivery Order 1

COMPLIANCE TESTING OF MOTOR VEHICLE BRAKE FLUID

Fifteen (15) tests will be conducted of FMVSS No. 16 in accordance with NHTSA Laboratory Test Procedure TP-116-02 dated November 1973.

Hauser Laboratories, 5580 Central Ave., P. O. Box G, Boulder, Colo. 80302
To be completed one (1) year from date of contract award
$5,250.00

DOT-HS-5-01105 Delivery Order 1

COMPLIANCE TESTING OF DOOR LOCKS AND DOOR RETENTION COMPONENTS - PASSENGER CARS, MULTIPURPOSE PASSENGER VEHICLES, AND TRUCKS

Fifteen (15) tests of FMVSS No. 206 will be conducted in accordance with NHTSA Laboratory Test Procedure TP-206-02 dated November 1973.

Dayton T. Brown, Inc., Church St., Bohemia, L.I., N.Y. 11716
No change
$3,975.00

DOT-HS-5-01124

MATHEMATICAL RECONSTRUCTION OF ACCIDENTS

Calspan Corporation, 4455 Genesee St., Buffalo, N.Y. 14221
To be completed four (4) months from date of contract award
$24,901.00 0hem

DOT-HS-067-1-087 Mod. 19

THE FAIRFAX ALCOHOL SAFETY ACTION PROJECT

A revised detailed project plan is to be submitted to the National Highway Traffic Safety Administration (NHTSA) not later than 3 March 1975. It will be based upon the changes described in the two year extension proposal 1 January 1975 through 31 December 1976) with those adjustments and clarifications developed during the site visit conducted by NHTSA personnel. 0fic

Virginia Highway Safety Division, P. O. Box 27472, Richmond, Va. 23261
Extended through 15 Apr 75
Increased $90,000.00

DOT-HS-150-3-668 Mod. 4

EFFECT OF MARIJUANA AND ALCOHOL ON VISUAL SEARCH PERFORMANCE

Due to equipment malfunction during marihuana test runs it will be necessary to duplicate the testing. Five (5) subject runs under both placebo and marijuana conditions, a total of ten (10) additional runs, will be conducted. 0tme

The Regents of the University of California, Los Angeles, 405 Hilgard Ave., Los Angeles, Calif. 90024
Extended through 31 Jul 75
Increased $19,996.00

DOT-HS-206-2-335 Mod. 5

FATALITY ACCIDENT FILE

State of Missouri, Division of Highway Safety, 2634 Industrial Dr., Jefferson, Mo. 65101
Extended to 28 Feb 75
Increased $5,000.00

DOT-HS-211-2-360 Mod. 6

FATALITY ACCIDENT FILE

Collection and organization of reports of all motor vehicle traffic accidents in which there is a fatality will be continued so that a uniform structure will contain data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants of the vehicles. Materials from which data elements will be extracted will include official records of law enforcement officers' traffic accident reports; supplementary information from the States' enforcement report files; driver history files; death certificates; coroners' reports; and autopsy reports. This data is to establish a statistical record which will contain the information needed to produce periodic reports describing the accident environments, to track the various accident countermeasure programs, and to provide data for the States to evaluate their problems and programs with respect to the region and the nation as a whole.

State of Maryland, Maryland State Police, Pikesville, Md. 21208
Extended to 31 Dec 77
Increased $21,296.00

DOT-HS-232-2-399 Mod. 4

FATALITY ACCIDENT FILE

Collection and organization of reports of all motor vehicle traffic accidents in which there is a fatality will be continued so that a uniform structure will contain data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants of the vehicles. Materials from which data elements will be extracted will include official records of law enforcement officers' traffic accident reports; supplementary information from the States' enforcement report files; driver history files; death certificates; coroners' reports; and autopsy reports. This data is to establish a statistical record which will contain the information needed to produce periodic reports describing the accident environments, to track the various accident countermeasure programs, and to provide data for the States to evaluate their problems and programs with respect to the region and the nation as a whole.

State of Georgia, Department of Public Safety, P. O. Box 1456, Atlanta, Ga. 30301
Extended to 31 Dec 77
Increased $19,200.00

DOT-HS-247-2-434 Mod. 5

FATALITY ACCIDENT FILE

Collection and organization of reports of all motor vehicle traffic accidents in which there is a fatality will be continued so that a uniform structure will contain data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants of the vehicles. Materials from which data elements will be extracted will include official records of law enforcement officers' traffic accident reports; supplementary information from the States' enforcement report files; driver history files; death certificates; coroners' reports; and autopsy reports. This data is to establish a statistical record which will contain the information needed to produce periodic reports describing the accident environments, to track the various accident countermeasure programs, and to provide data for the States to evaluate their problems and programs with respect to the region and the nation as a whole.

State of Kentucky, Department of Public Safety, State Office Building, Frankfort, Ky. 40601
Extended to 31 Dec 77
Increased $6,339.00

DOT-HS-286-3-546 Mod. 3

FATALITY ACCIDENT FILE

Collection and organization of reports of all motor vehicle traffic accidents in which there is a fatality will be continued so that a uniform structure will contain data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants of the vehicles. Materials from which data elements will be extracted will include official records of law enforcement officers' traffic accident reports; supplementary information from the States' enforcement report files; driver history files; death certificates; coroners' reports; and autopsy reports. This data is to establish a statistical record which will contain the information needed to produce periodic reports describing the accident environments, to track the various accident countermeasure programs, and to provide data for the States to evaluate their programs and problems with respect to the region and the nation as a whole.

State of Oklahoma, Highway Safety Programs, 1118 United Founders Tower, Oklahoma City, Okla. 73112
Extended to 31 Dec 77
Increased $16,814.00

DOT-HS-294-3-560 Mod. 3

FATALITY ACCIDENT FILE

Collection and organization of reports of all motor vehicle traffic accidents in which there is a fatality will be continued so that a uniform structure will contain data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants of the vehicles. Materials from which data elements will

be extracted will include official records of law enforcement officers' traffic accident reports; supplementary information from the States' enforcement report files; driver history files; death certificates; coroners' reports; and autopsy reports. This data is to establish a statistical record which will contain the information needed to produce periodic reports describing the accident environments, to track the various accident countermeasure programs, and to provide data from the States to evaluate their programs and problems with respect to the region and the nation as a whole.

State of Rhode Island, Office of Highway Safety, Providence, R.I. 02903
Extended to 31 Dec 77
Increased $8,078.72

DOT-HS-296-3-562 Mod. 3

FATALITY ACCIDENT FILE

Collection and organization of reports of all motor vehicle traffic accidents in which there is a fatality will be continued so that a uniform structure will contain data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants of the vehicles. Materials from which data elements will be extracted will include official records of law enforcement officers' traffic accident reports; supplementary information from the States' enforcement report files; driver history files; death certificates; coroners' reports; and autopsy reports. This data is to establish a statistical record which will contain the information needed to produce periodic reports describing the accident environments, to track the various accident countermeasure programs, and to provide data for the States to evaluate their programs and problems with respect to the region and the nation as a whole.

State of Nebraska, Department of Roads, Statehouse Station. P. O. Box 94759, Lincoln, Nebr. 68509
Extended to 31 Dec 77
Increased $11,315.00

DOT-HS-303-3-576 Mod. 4

VEHICLE LEASE AGREEMENT

In addition to the $50.00 per month now being paid as rental on six (6) high mileage 1973 sedans, $15.00 per car per month will be paid for the installation and maintenance of crash recorders. This increase in funding is for twelve (12) months rental of six (6) vehicles at $65.00 per month per car.

PHH Leasing, Inc., Peterson, Howell and Heather, Inc., 2701 No. Charles St., Baltimore, Md. 21218
No change
Increased $4680.00

DOT-HS-312-3-598 Mod. 4

FATALITY ACCIDENT FILE

Collection and organization of reports of all motor vehicle traffic accidents in which there is a fatality will be continued so that uniform structure will contain data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants of the vehicles. Materials from which data elements will be extracted will include official records of law enforcement officers' traffic accident reports; supplementary information from the States' enforcement report files; driver history files; death certificates; coroners' reports; and autopsy reports. This data is to establish a statistical record which will contain the information needed to produce periodic reports describing the accident environments, to track the various accident countermeasure programs, and to provide data for the States to evaluate their problems and programs with respect to the region and the nation as a whole.

State of Nevada, Department of Motor Vehicles, Office of Highway Safety, 1923 No. Carson St., Suite 209, Carson City, Nev. 89701
Extended to 31 Dec 75
Increased $3,630.00

DOT-HS-316-3-604 Mod. 3

FATALITY ACCIDENT FILE

Collection and organization of reports of all motor vehicle traffic accidents in which there is a fatality will be continued so that uniform structure will contain data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants of the vehicles. Materials from which data elements will be extracted will include official records of law enforcement officers' traffic accident reports; supplementary information from the States' enforcement report files; driver history files; death certificates; coroners' reports; and autopsy reports. This data is to establish a statistical record which will contain the information needed to produce periodic reports describing the accident environments, to track the various accident countermeasure programs, and to provide data for the States to evaluate their problems and programs with respect to the region and the nation as a whole.

State of Arizona, Arizona Highway Department, 206 So. 17th Ave., Phoenix, Ariz. 85007
Extended to 31 Dec 77
Increased $4,890.00

DOT-HS-321-3-620 Mod. 3

FATALITY ACCIDENT FILE

Collection and organization of reports of all motor vehicle traffic accidents in which there is a fatality will be continued so that uniform structure will contain data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants of the vehicles. Materials from which data elements will be extracted will include official records of law enforcement officers' traffic accident reports; supplementary information from the States' enforcement report files; driver history files; death certificates; coroners' reports; and autopsy reports. This data is to establish a statistical record which will contain the information needed to produce periodic reports describing the accident environments, to track the various accident countermeasure programs, and to provide data for the States to evaluate their problems and programs with respect to the region and the nation as a whole. 0.

State of Alaska, Division of Technical Services, Pouch N, Juneau, Alaska 99801
Extended to 31 Dec 77
Increased $3,643.52

DOT-HS-327-3-632 Mod. 3

FATALITY ACCIDENT FILE

Collection and organization of reports of all motor vehicle traffic accidents in which there is a fatality will be continued so that uniform structure will contain data describing the accident, roadway, vehicles, drivers, occupants and nonoccupants of the vehicles. Materials from which data elements will be extracted will include official records of law enforcement officers' traffic accident reports; supplementary information from the States' enforcement report files; driver history files; death certificates; coroners' reports; and autopsy reports. This data is to establish a statistical record which will contain the information needed to produce periodic reports describing the accident environments, to track the various accident countermeasure programs, and to provide data for the States to evaluate their problems and programs with respect to the region and the nation as a whole.

State of Idaho, Department of Highways, P. O. Box 7129, Boise, Idaho 83707
Extended to 31 Dec 77
Increased $6,311.00

DOT-HS-345-3-691 Mod. 5

DEVELOPMENT OF IMPROVED INFLATION TECHNIQUES

Olin Corporation, Energy Systems Operation, Broadway Office, East Alton, Ill. 62024
No change
Increased $42,072.00 zat

DOT-HS-350-3-707 Mod. 3

ALCOHOL SAFETY ACTION PROGRAM LEVEL II GROUP DYNAMICS MODEL

Instructor training programs and supervised courses will certify six (6) additional instructors in Denver and three (3) instructors in New Orleans. The contractor will participate in the April Short Term Rehabilitation Evaluation Workshop, sponsored by the National Highway Traffic Safety Administration (NHTSA), as a technical advisor; provide continued technical assistance services to persons certified as Power Motivation Training (PMT) instructors; and provide other assistance on emergencies which may arise in the course of implementing and conducting PMT programs. 0cor

McBer and Company, 137 Newbury Street, Boston, Mass. 02116
Extended to 31 Dec 75
Increased $24,830.00

DOT-HS-357-3-721 IA Mod. 3

EXPLORATORY ANALYSIS OF THE FATALITY ACCIDENT FILE

Potential study areas for analysis of 1973 and 1974 fatality accident files (FAF) will include: the effect on reduction of pedestrian and vehicle occupant fatalities of the introduction of a nationwide 55 mph speed limit; basic differences in pedestrian and occupant (by seating position) fatality frequency by the precrash vehicle manuever; the effects of the magnitude of deviations from legal speed and level of traffic volume on frequencies of fatalities (with and without restraint usage); the relationships of length of previous driving experience in fatal accidents; and the effects of introducing daylight savings time during December 1973 on the number of pedestrian fatal accidents. Analysis findings and recommendations will be organized and presented in such a way so as to be easily reviewed and understood by the general public and in a further detailed way to be of interest and value to National Highway Traffic Safety Administration (NHTSA) analysts.

E. L. Little, L. G. Hanscomb Field, Bedford, Mass. 01730
To be completed 30 Jun 1975
$75,237.00

DOT-HS-357-3-721 IA Mod. 4

PADSAP AGENCY ENROLLMENT AND COMPUTER SOFTWARE DEVELOPMENT

Phase I design assumption that various state, city, town and county police agencies can be enlisted as the mechanism to collect Pedestrian-Bicyclist Accident Data Sampling and Analysis Program (PADSAP) data will be tested by obtaining agreements from 24 agencies to provide 12 months worth of data. Following selection of these agencies, supplemental data forms will be developed and agency participants will be instructed on their role in the pilot study. Computer software, programs and procedures necessary to support other survey operations will be initiated. These operations will include frame maintenance, sample selection, quality control, estimation, analysis and report generation.

M. E. L. Little, L. G. Hanscomb Air Field, Bedford, Mass. 01730
To be completed 31 May 75
$164,150.00

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